



# Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

An ISO 9001  
Company

<b>ENQUIRY</b>	Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : <a href="mailto:tvenkat@bheltry.co.in">tvenkat@bheltry.co.in</a> Web : <a href="http://www.bhel.com">www.bhel.com</a>
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	<b>Enquiry Number:</b>	<b>Enquiry Date:</b>	<b>Due date for submission of quotation:</b>
	<b>2620700050</b>	<b>31.07.2007</b>	<b>15.10.2007</b>

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

Item	Description	Quantity	Delivery Schedule
10	8000 Ton Hydraulic Press as per the technical specification & commercial conditions applicable (to be downloaded from web site <a href="http://www.bhel.com">www.bhel.com</a> or <a href="http://tenders.gov.in">http://tenders.gov.in</a> )	1 No.	30.10.2008

1. A pre-bid conference is proposed to be conducted with prospective vendors to clarify any clause of the tender document. Modifications, if any, would be carried out to the tender document based on the pre-bid discussion and this will form the basis for inviting techno-commercial offer and price bids
2. Pre-Bid Conference will be held on the date, time, and venue given below  
 DATE OF PRE-BID CONFERENCE: 27<sup>th</sup>, 28<sup>th</sup> & 29<sup>th</sup> August 2007  
 TIME: 10.00 AM onwards  
 VENUE: BHEL, Tiruchirappalli – 620 014

**BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats along with technical specifications can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference “2620700050”.**

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, <b>For BHARAT HEAVY ELECTRICALS LIMITED</b>  Manager / Capital Purchase / MM / Manufacturing
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**NOTICE INVITING FOR PRE-BID CONFERENCE**

**TENDER NOTICE: No 2620700050 dated 31.07.2007**

1. BHEL Tiruchirapalli has invited a Tender for supply of 8000 Tonne Electro-Hydraulic Press for forming of U-Shells and Hemispherical Ends for Steam Drum forming part of Steam Generator for Utility and Industrial Boilers
2. A pre-bid conference is proposed to be conducted with prospective vendors to clarify any clause of the tender document. Modifications, if any, would be carried out to the tender document based on the pre-bid discussion and this will form the basis for inviting techno-commercial offer and price bids
3. The preliminary tender document on which pre-bid discussions will be held is displayed in our Web Site ([www.bhel.com](http://www.bhel.com)) under the head Tender Notices as well as in <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page under Enquiry reference "2620700050")
4. Prospective bidders are requested to study the preliminary tender documents and submit their request for clarification, if any, in the format shown below so as to reach the undersigned positively before the date of Pre-Bid Conference

Sl. No	PART A / PART B of Tender Document	Page No	Clause No	Subject	Query / Clarification Required

5. Prospective bidders can attend the Pre-Bid Conference on the date and venue mentioned. They are requested to come prepared for stay at Tiruchirapalli for a period of 2 to 3 days. Pre-bid conference will be held in the presence of all the prospective bidders or their authorized representatives
6. Tender documents, with modifications if any, consequent to the Pre-bid Conference, will be posted in our web site by **6<sup>th</sup> Sep 2007** and the offer to be submitted shall be within the framework of the Tender documents posted after the Pre Bid conference.
7. Prospective bidders are requested to furnish the contact person's name, phone number, fax number, e-mail ID etc
8. Pre-Bid Conference will be held on the date, time, and venue given below  
**DATE OF PRE-BID CONFERENCE: 27<sup>th</sup>, 28<sup>th</sup> & 29<sup>th</sup> August 2007**  
**TIME: 10.00 AM onwards**  
**VENUE: BHEL, Tiruchirappalli – 620 014**
9. BHEL reserves it's right to cancel the tender, part or in full, at their own discretion and any such action is not liable for any question or claim against BHEL.

**PART A.****SECTION – I : QUALIFYING CRITERIA**

The BIDDER / VENDOR has to meet the following requirements to get qualified for submitting an offer for the 8000 Ton PRESS :

[Additional Sheets shall be attached with the OFFER, to provide requisite details]

<b>S.No.</b>	<b>REQUIREMENTS</b>	<b>VENDOR's RESPONSE</b>
<b>1.0</b>	"Only those vendors (OEMs), who have supplied and commissioned at least one Hot Forming Press of min 6000T capacity for hot pressing of steel plate of min 10000mm x100mm (Length x thickness) should quote. The vendor should have experience in progressive bending of hot steel plates. The press should presently be working satisfactorily for more than one year after commissioning. However, if such press (s) has/had been supplied to BHEL, then such machine should be presently working satisfactorily for more than six months after its commissioning and acceptance in BHEL. The following information should be submitted by the vendor about the companies where similar machines have been supplied. This is required from all the vendors for qualification of their offer"	
<b>2.0</b>	Name of the Customer / Company where the machine is installed.	
<b>3.0</b>	Complete Postal Address of the Customer.	
<b>4.0</b>	Year of Commissioning.	
<b>5.0</b>	Parameters of Machine(s) supplied (parameters as mentioned in Clause <b>1.0</b> above ) and application for which the machine is supplied.	
<b>6.0</b>	Name and designation of the contact person of the Customer.	
<b>7.0</b>	Phone No., FAX No. and e-mail address of the contact person of the Customer.	
<b>8.0</b>	Performance certificate from the customers regarding satisfactory performance of press supplied to them (Original Certificate or Through E-mail directly from the customer). The original performance certificate may be returned after verification by BHEL, if required by vendor.	

**SECTION – I : COMPANY PROFILE**

The BIDDER is requested to provide details listed in the table given below :

<b>S.No.</b>	<b>PARTICULARS</b>	<b>VENDOR's RESPONSE</b>
<b>9.0</b>	Number of Years of Experience of the BIDDER / VENDOR in the field of Design, Manufacture, Supply and Commissioning of Large Presses.	
<b>10.0</b>	Number of Hydraulic Presses supplied and installed till date in the following category (Classification based on CAPACITY ) with details on customers : a) Above 6000 Tons b) Upto 6000 Tons	
<b>11.0</b>	Details on International Standards or Codes followed in the Design of Presses	[Elaborate Details are to be compulsorily provided]
<b>12.0</b>	Details of Manufacturing Facilities : a) Fabrication Facilities b) Heat Treatment Facilities c) Heavy Machining Facilities d) Assembly & Load Testing Facilities	
<b>13.0</b>	Details of Quality System (with Stages of Internal Inspection) followed for the Fabrication and Non-Destructive Testing (NDT) of Weldments	
<b>14.0</b>	Details on AFTER-SALES-SERVICE Set-Up in INDIA for providing timely service support to BHEL	

**SECTION – III : BID / OFFER FORMAT**

The BIDDER / VENDOR has to note the following :

<b>S.No.</b>	<b>REQUIREMENTS</b>	<b>VENDOR's COMPLIANCE</b>
<b>15.0</b>	The BIDDER shall submit the offer in TWO PARTS - Technical [with PART A & PART B] & Commercial and Price Bid.	
<b>16.0</b>	The OFFER shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each Clause. A just 'YES' or 'CONFIRMED' or 'NO-DEVIATION' or 'COMPLIES' or 'ACCEPTED' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.	
<b>17.0</b>	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria	
<b>18.0</b>	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 of the inclusion of all the accessories, tooling, attachments, auxiliary parts, spares, consumables, etc. with the main and basic equipment, to meet the technical specification requirements.	

 <b>BHARAT HEAVY ELECTRICAL LIMITED</b> High Pressure Boiler Plant Tiruverumbur Tiruchirapalli-620 014 TamilNadu, India	<b>Enquiry No. :</b>	
	<b>Due Date :</b>	
	<b>Supplier Qtn. No.:</b>	
	<b>Date :</b>	

**PART-B: SPECIFICATION CUM COMPLIANCE CERTIFICATE FOR 8000T PRESS**

**NOTE:-**

1. The "Offer" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.
2. The offer and all documents enclosed with offer should be in English language only.

<b>NAME &amp; ADDRESS OF THE SUPPLIER :</b>	
<b>TELEPHONE NOS.:</b>	
<b>FAX NOS.:</b>	
<b>E-MAIL ADDRESS :</b>	

**SCOPE: SUPPLY, ERECTION & COMMISSIONING OF 8000T DRUM SHELL FORMING PRESS**

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SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
<b>1.0</b>	<b>PURPOSE &amp; WORKPIECE MATERIAL</b>				
<b>1.1</b>	<p><b>Purpose:</b></p> <p>A. Hot Forming of Industrial and Utility Boiler Drum “U” Shells  B. Hot Forming of Hemispherical / Semi-ellipsoidal dished ends  C. Cold Forming of U-Shells</p> <p>The material, dimensions and working temperatures are as given below.  Typical sketches of the Drum "U" - Shells and Photograph of Hemispherical Dished Ends are given in ANNEXURE – 1 and ANNEXURE - 2.</p> <p>The included angle for these “U” – Shells ranges from 150 degrees to 230 degrees. After initial hot forming of U-shells, final dimension correction under cold condition / cold calibration is to be carried out by applying load over a smaller area of the shell.</p>	Vendor to Note & Confirm Suitability of offered press for this purpose			
<b>1.2</b>	<b>Work Piece Description:</b>	Vendor to Note & Confirm Suitability			
<b>1.2.1</b>	<b>U-Shell - Hot Pressing:</b>				
<b>1.2.1.1</b>	Plate thickness range (mm)	25 to 205			
<b>1.2.1.2</b>	Min / Max Width (mm)	1300 / 4000			
<b>1.2.1.3</b>	Length (mm)	3000 to 11500			
<b>1.2.1.4</b>	Internal Diameter of half shell (mm)	700 to 2300			
<b>1.2.1.5</b>	Plate material	SA299 Gr.B / SA515 Gr.70 / SA302 Gr C, WB 36			
<b>1.2.1.6</b>	Temperature of the plate while taking out of furnace (deg C)	870 to 1010			
<b>1.2.1.7</b>	Min. Permitted temperature of the plate at the time of Pressing completion (deg C).	650.00			
<b>1.2.1.8</b>	Time for completion of a U-shell of varied thickness, length and diameter in one hot pressing cycle from the time job is loaded on plate transporting device (in minutes)	25 to 45			
<b>1.2.1.9</b>	Accuracy Specification Ovality at every one meter Skew	0.5 % of ID (max) 3 mm / m (max)			
<b>1.2.1.10</b>	Unbent portion (mm)	Vendor to Specify			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
1.2.1.11	Max. profile departure with respect to template after Cold Calibration with respect to finished ID (mm)	+/- 4.0 mm			
<b>1.2.2</b>	<b>U-Shell - Cold pressing (Other than cold calibration of U-Shells Hot Pressed as in (1.2.1) above) (Max permitted outer fiber elongation = 3.5%)</b>				
1.2.2.1	Plate thickness range (mm)	25 to 100			
1.2.2.2	Min / Max Width (mm)	1300 / 4000			
1.2.2.3	Length (mm)	3000 to 11500			
1.2.2.4	Internal Diameter of half shell (mm)	700 to 2300			
1.2.2.5	Plate material	Carbon Steel / Low alloy steel / Stainless Steel / Cladded steel to a max yield strength of 441 MPa			
1.2.2.6	Accuracy Specification Ovality at every one meter Skew	0.5 % of ID (max) 3 mm / m (max)			
1.2.2.7	Unbent portion (mm)	Vendor to Specify			
1.2.2.8	Max. profile departure of ID with respect to template	+ / - 4 mm			
<b>1.2.3</b>	<b>Hemispherical / Semi-ellipsoidal Dished End Hot Pressing:</b>				
1.2.3.1	Max. thickness of plate (mm)	185.00			
1.2.3.2	Inner Diameter of Dished end (mm)	1650 - 2300			
1.2.3.3	Plate material	SA299 Gr.B / SA515 Gr.70 / SA302 Gr C, WB 36			
1.2.3.4	Temperature of the plate while taking out of furnace (deg C)	870 to 1010			
1.2.3.5	Min. Permitted temperature of the plate at the time of Pressing completion (deg C).	650.00			
1.2.3.6	Time for completion of a Dished end of varied thickness and diameter in one hot pressing cycle from the time job is loaded on plate transporting device (in minutes)	25 to 45			
1.2.3.7	Max. profile departure with respect to finished ID	+/- 4.0 mm			

<b>SNO</b>	<b>DESCRIPTION FOR BHEL REQUIREMENT</b>	<b>BHEL SPEC</b>	<b>OFFER</b>	<b>DEVIATIONS</b>	<b>REMARKS</b>
<b>1.2.3.8</b>	Accuracy Specification Ovality	1 % of ID (max)			
<b>1.2.4</b>	Weight of workpiece (Kgs)	4000 to 75000			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
<b>2.0</b>	<b>SPECIFICATION:</b>				
<b>2.1</b>	<b>MACHINE CONFIGURATION:</b>				
<b>2.1.1</b>	Four Column Oil Hydraulic Press complete with pressing ram, upper tool, lower tool, job transporting system, radius setting arrangement, job manipulating system, tool changing arrangement and tooling	Vendor to provide details			
<b>2.2</b>	<b>PRESS:</b>				
<b>2.2.1</b>	Type of Press	Oil Hydraulics Press			
<b>2.2.2</b>	Type of Action	Down stroking			
<b>2.2.3</b>	Type of Construction	Four Column Vertical Traversing			
<b>2.2.4</b>	The rigidly connected press frame on the foundation beams shall mainly consists of the lower cross head, the uprights, the upper cross heads, the cross beam and the four tie rods with nuts (4 columns) thus forming a rigid unit. The four uprights between upper cross heads and lower crosshead shall be pre-stressed by the four main tie rods. A pressing ram, suitably guided by the four columns, shall be provided for carrying the top tool for pressing	Vendor to Confirm and provide details			
<b>2.2.5</b>	Max Pressing Force (kN)	80000			
<b>2.2.6</b>	Total return force	Vendor to Specify			
<b>2.2.7</b>	Return force (without tool)	Vendor to specify			
<b>2.2.8</b>	Daylight (mm)	Vendor to Specify			
<b>2.2.9</b>	Stroke of ram (mm)	Vendor to Specify			
<b>2.2.10</b>	Stroke control accuracy (mm)	± 1			
<b>2.2.11</b>	Fast approach (Down Stroke) speed (mm/min)	Vendor to Specify			
<b>2.2.12</b>	Return Speed (mm/min)	Vendor to Specify			
<b>2.2.13</b>	Clear distance between columns: (mm) a) Between Front & Back Columns b) Between Right & Left Columns	Vendor to Specify			
<b>2.2.14</b>	Minimum / Maximum Length of Plate for Shell Forming	3000 / 11500			
<b>2.2.15</b>	Range of Plate Diameter for Dished End Pressing (mm)	2500 - 3000			
<b>2.2.16</b>	Shortest length on which pressing force of 80000 kN can be applied (should be less than 3000 mm)	Vendor to Specify			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.2.17	Max. permissible load that can be applied on the shortest possible length during cold calibration (vendor to furnish the load and corresponding length / area)	Vendor to Specify			
2.2.18	Smallest diameter on which pressing force of 40000 kN can be applied when pressing dished end (should be less than 1600 mm)	Vendor to Specify			
2.2.19	Smallest diameter on which load of 80000 kN can be applied (mm)	Vendor to Specify			
2.2.20	The press ram shall be guided on the columns throughout its stroke	Vendor to Confirm and provide details			
2.2.21	Suitable provision shall be made to allow tilting of the ram along the length of ram and in transverse direction	Vendor to Confirm and provide details			
2.2.22	It should be possible to adjust, control and measure the amount of tilt along the longitudinal axis	Vendor to Confirm and provide details			
2.2.23	Inclination (tilt) range in the longitudinal axis (by means of push button on control desk for quick and easy adjustment during pressing)	± 20 mm			
2.2.24	Max Tilt in longitudinal axis (mm)	50.00			
2.2.25	Max tilt in transverse direction	Vendor to Specify			
2.2.26	If tilting exceeds the max value, further movement of ram should be disabled	Vendor to Confirm			
2.2.27	It should be ensured that with zero tilt, the ram always moves parallel to the base	Vendor to Confirm			
2.2.28	Ram should travel without tilt in the return (upward) stroke	Vendor to Confirm			
2.2.29	Suitable mechanical (electrically operated / electro-hydraulically operated) locking arrangement should be provided to lock the ram in its top position when not in use	Vendor to Confirm and provide details			
2.2.30	<b>Eccentric Loading:</b>				
2.2.30.1	<b>Eccentric loading in longitudinal axis</b>				
a)	At 1 m distance from center	Vendor to Specify			
b)	At 2 m distance from center	Vendor to Specify			
c)	At 3 m distance from center	Vendor to Specify			
d)	At 4 m distance from center	Vendor to Specify			
2.2.30.2	<b>Eccentric loading in the transvers direction</b>	Vendor to Specify			
2.2.30.3	Arrangement should be provided to allow controlled eccentric loading by applying a counter force on the ram by suitable means	Vendor to Provide Details			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.2.31	In case of tilting of the slide in longitudinal direction or transverse direction above a permissible limit, the press operation should get stopped.	Vendor to confirm			
2.2.32	<b>Deflection Compensation:</b>				
2.2.32.1	Suitable deflection-compensation mechanism should be provided to counter the deflection of the bottom tool under application of load by providing an adjustable positive camber	Vendor to Provide Details			
2.2.32.2	Range of deflection compensation (mm)	Vendor to Specify			
2.2.33	It should be possible to adjust the deflection compensation, tilt, bending stroke etc during pressing operation	Vendor to Confirm			
<b>2.3 PRESSING &amp; RETURN HYDRAULIC CYLINDERS :</b>					
2.3.1	The press shall be provided with suitable number of pressing and return cylinders mounted on the upper cross head	Vendor to Confirm			
2.3.2	Number of Cylinders	Vendor to Specify			
2.3.3	Working Pressure (Kg / Sq.cm)	Vendor to Specify			
2.3.4	Stroke Length (mm)	Vendor to Specify			
2.3.5	<b>Number of Pressing Cylinders</b>	Vendor to Specify			
a)	Piston Diameter (mm)	Vendor to Specify			
b)	Rod Diameter, if applicable (mm)	Vendor to Specify			
2.3.6	<b>Number of Return Cylinders</b>	Vendor to Specify			
a)	Piston Diameter (mm)	Vendor to Specify			
b)	Rod Diameter (mm)	Vendor to Specify			
2.3.7	Material of construction of Cylinder	Vendor to Specify			
2.3.8	Material of Construction of Piston	Vendor to Specify			
2.3.9	The pistons shall be connected to the moving ram by suitable mechanism which will enable tilting of the ram within safe limits	Vendor to Furnish Details of the arrangement			
2.3.10	Suitable controls shall be provided for selection of set of cylinders to have minimum 3 different pressing load ranges (like 2000 tons / 6000 tons / 8000 tons)	Vendor to Specify the number of ranges and max tonnage in each			
2.3.11	Suitable controls shall be provided in the control desk for varying the load infinitely and for limiting the load at desirable max value.	Vendor to confirm			
2.3.12	Pressing Speeds corresponding to each load range as in <b>clause 2.3.10</b> above	Vendor to Specify			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.3.13	Pressing speed should be variable through operator control in each of the above ranges	Vendor to Confirm			
2.3.14	Mechanism for control of Pressing Speed	Vendor to furnish full details			
<b>2.4 EJECTOR (if required):</b>					
2.4.1	Purpose of Ejector.	Vendor to furnish			
2.4.2	Ejector location	Vendor to Specify			
2.4.3	Ejector Force (kN)	Vendor to Specify			
2.4.4	Ejector Stroke	Vendor to Specify			
2.4.5	Ejector Speed (mm/min)	Vendor to Specify			
2.4.6	Mechanism for control of Ejector Speed	Vendor to furnish details			
2.4.7	Operating Pressure (Kg / Sq.cm)	Vendor to Specify			
2.4.8	Cylinder Size	Vendor to Specify			
2.4.9	Material of construction of Cylinder	Vendor to Specify			
2.4.10	Suitable interlocks for Ejector Operation	Vendor to Specify			
<b>2.5 JOB TRANSPORTING SYSTEM:</b>					
2.5.1	<p>The job will be loaded outside the 4 columns of the press using existing overhead crane. The vendor has to provide suitable transport arrangement to move the job (hot / cold rectangular plate for forming into a U-shell, formed hot / cold U-Shell for calibration, hot circular plate for Hemispherical / Semi-ellipsoidal dished end pressing etc).</p> <p>Vendor has to clearly specify whether the arrangement envisages loading of plate / shell onto the bottom tool before moving the tool with plate/ shell into the press or whether the bottom tool is located within the press and the plate/shell is then loaded onto the bottom tool.</p> <p>Since the pressing has to be carried out in off-center position of job also, it is preferred that the bottom tool is located on the job transport mechanism to facilitate positioning of bottom tool with job in positions away from the center</p>	Vendor to Furnish Details of the arrangement			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.5.2	It should be possible to automatically position the job transportation system at every 1 meter distance from the centre to a maximum of 5 meters on either side. Repositioning required even during pressing of a job.	Vendor to confirm			
2.5.3	Length & width of job transport arrangement	Vendor to Specify			
2.5.4	Weight carrying capacity of job transport arrangement	Vendor to Specify			
2.5.5	Type of drive arrangement for the job transport mechanism	Vendor to Specify			
2.5.6	Power rating of drive	Vendor to Specify			
2.5.7	Speed of job transport mechanism.	Vendor to Specify			
2.5.8	Braking arrangement to stop job transport mechanism at desired location	Vendor to Specify			
2.5.9	Clamping mechanism at desired location	Vendor to Specify			
2.5.10	Accuracy of positioning (mm)	Vendor to Specify			
2.5.11	Top surface of the job transport mechanism should be provided with T-slots. Number and size of T-Slots should be furnished	Vendor to furnish details			
<b>2.6 JOB MANIPULATOR:</b>					
2.6.1	Suitable system should be provided for manipulating the plate (Shifting the plate laterally for progressive bending) during U-Shell forming operation both in hot and in cold condition and during cold calibration	Vendor to furnish details			
2.6.2	It should be ensured that the plate does not drag over the bottom tool die during the above process. Details of how this is prevented should be furnished	Vendor to furnish details			
2.6.3	The system should be suitable for handling the shell during cold calibration also.	Vendor to confirm			
2.6.4	The system should be suitable for edge bending and formation of the U-shell progressively from plate to U-shell of different radii	Vendor to confirm			
2.6.5	Provision to move the plate to align the plate edge in a straight line (squaring of plate) along the length	Vendor to furnish details			
2.6.6	Mechanism to support the plate during the entire process of bending to a U-shape by pressing .	Vendor to furnish details			
2.6.7	The transport of plate in transverse direction should be slip free	Vendor to furnish details			
<b>2.7 TOOLING:</b>					

<b>SNO</b>	<b>DESCRIPTION FOR BHEL REQUIREMENT</b>	<b>BHEL SPEC</b>	<b>OFFER</b>	<b>DEVIATIONS</b>	<b>REMARKS</b>
2.7.1	Suitable upper tool with die and lower tool with die should be supplied for Hot & Cold Bending by Pressing, Cold Calibration and Hemispherical / Semi-ellipsoidal dished End Pressing.	Vendor to Furnish Details of the Tooling			
2.7.2	Suitable arrangement should be provided for easy changing and mounting of tool for the different operations like forming of U-Shell & pressing of Hemispherical / Semi-ellipsoidal Dished End pressing	Vendor to Furnish Details			
2.7.3	Tool for hot and cold bending of plate in to a U-Shell should have mechanism for forming various diameters of U-shells without physical changing of tools for each radius. The same provision should be available for Cold Calibration also.	Vendor to Furnish Details			
2.7.4	Provision on the tool to fix and remove punches / dies used for Pressing, based on the required length for hot Pressing of U-Shell or cold correction operations.	Vendor to Furnish Details			
2.7.5	Provision for locating and centering the bottom tool for Hemispherical / Semi-ellipsoidal Dished End pressing over the ejector, if required.	Vendor to Furnish Details			
2.7.6	Provision for locating and centering plate over tool for Hemispherical / Semi-ellipsoidal Dished End pressing	Vendor to Furnish Details			
2.7.7	Method by which the formed dished end can be easily detached from tool	Vendor to Furnish Details			
2.7.8	Provision for mounting the tools and locking in position through quick change mechanism so that the tools for shell forming and dished end forming can be changed as required with least effort and time with necessary inbuilt mechanical safety mechanism. Time required for changing should be less than 2 shifts.	Vendor to Furnish Details			
2.7.9	Bottom surface of bottom tool shall be at floor level	Vendor to Confirm			
2.7.10	It should be possible to adjust the length / portion of pressing during cold calibration without having to remove or replace the tool dies	Vendor to furnish details			
2.7.11	Requirement of dies for hot Pressing and cold calibration.	Vendor to Specify			
2.7.12	Material of construction of the upper and lower tools should be furnished	Vendor to Specify			
2.7.13	Method of removing upper tool and lower tool for maintenance and method of mounting the same after maintenance	Vendor to furnish details			
2.7.14	Method of prevention of ingress of scales from hot plate into various parts of the tools / press	Vendor to furnish details			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.7.15	One set of tools for U-shell pressing and for Hemispherical Dished end pressing to be supplied with the press.	Vendor to Confirm and furnish details			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
<b>2.8</b>	<b>MEASURING &amp; INDICATING SYSTEMS:</b>				
<b>2.8.1</b>	Suitable electronic measuring devices and indicating devices for set and actual values shall be provided in the press to measure the following:	Vendor to Confirm			
<b>a)</b>	Pressing Force				
<b>b)</b>	Pressing pressure with limit settings				
<b>c)</b>	Ram position				
<b>d)</b>	Tilt				
<b>e)</b>	Stroke and Stroke Stop position				
<b>f)</b>	Position of Job Transporting Device				
<b>g)</b>	Setting of Tool for Radius of U-Shell				
<b>h)</b>	Ejector Force				
<b>j)</b>	Ejector stroke Position				
<b>k)</b>	Deflection compensation,				
<b>l)</b>	Other measurements as may be required	Vendor to List			
<b>2.8.2</b>	Description of the measurement, and details of measuring & indicating devices should be furnished with the offer	Vendor to furnish			
<b>2.9</b>	<b>CONSTRUCTION:</b>				
<b>2.9.1</b>	Vendor to furnish details of material, hardness & constructional details, including explanatory drawings, of various components/assemblies of the press.	Vendor to Furnish			
<b>2.9.2</b>	Video images on CD / hard copy explaining the technical features with photographs, drawings explaining the technical features should be enclosed with the offer.	Vendor to Furnish			
<b>2.9.3</b>	Special features including special maintenance aids, if any	Vendor to Furnish			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
<b>2.10</b>	<b>MAINTENANCE PLATFORM:</b>				
<b>2.10.1</b>	Suitable platforms, walkways and ladders shall be provided at various heights and around the press for carrying out maintenance on cylinders, valves, pipelines etc of the press.	Vendor to Furnish Details			
<b>2.10.2</b>	Grill type platforms and walkways shall be provided	Vendor to Confirm			
<b>2.10.3</b>	Ladders shall be provided with safety cage	Vendor to Confirm			
<b>2.11</b>	<b>OPERATION AND CONTROL SYSTEM: OPERATOR'S PANEL:</b>				
<b>2.11.1</b>	Desk type operator's panel having complete MMI and machine control system with display shall be provided. All switches on the Operator's panel should be within easy reach of operator for convenient, efficient & safe operation. All displays/indications should also be conveniently placed accordingly. Layout showing complete details of the control desk should be submitted.	Vendor to provide details			
<b>2.11.2</b>	Suitable transparent heat shield shall be provided for the operator at the control desk	Vendor to provide details			
<b>2.11.3</b>	An auxiliary control desk which can be taken close to the press for operations required for dished end pressing should be provided	Vendor to Confirm			
<b>2.11.4</b>	The main operator panel and aux control desk shall be provided with suitable dust-proof covers to protect the switches, displays etc from dust when not used.	Vendor to provide details			
<b>2.11.5</b>	SCADA / Mimic Type Panel shall be provided to give a display of the operating status of important hydraulic and mechanical elements of the press on a diagram	Vendor to provide details			
<b>2.11.6</b>	Press should be able to operate in Setting / Manual / Automatic Modes	Vendor to provide details			
<b>2.11.7</b>	In setting mode the press and accessories should operate at its lowest speed for job setting and maintenance purpose	Vendor to provide details			
<b>2.11.8</b>	Joystick Type controls with provision to control operation and to adjust speed based on joystic position should be provided for the following operations in the Main and Auxiliary Desks:	Vendor to provide details			
	a) Control of Ram for Pressing & Return				
	b) Ejector				
	c) Job manipulation during Pressing				

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.11.9	Push button controls for radius setting, operation of job transport mechanism, tool clamping mechanism, deflection compensation, ram locking, etc. should be provided.	Vendor to specify various controls provided.			
<b>2.12 PLC SYSTEM &amp; FEATURES :</b>					
2.12.1	Make : Siemens / Allen Bradley / Messung / Melsec make.	Vendor to specify			
2.12.2	Model	Vendor to specify			
2.12.3	Details of Standard features. List to be submitted.	Vendor to Furnish			
2.12.4	Standard accessories, like PLC Programming Unit etc, required for monitoring, control and maintenance should be supplied	Vendor to Furnish List & Details			
2.12.5	Provision for automatic safe shut down of Press in case of Power Failure	Vendor to Furnish Details			
<b>2.13 AIR CONDITIONERS:</b>					
2.13.1	Air Conditioners with Dehumidifiers of suitable / sufficient capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Detailed specifications of the same are to be submitted.	Vendor to Confirm			
<b>2.14 HYDRAULIC SYSTEM : Details should be Submitted by the Vendor</b>					
2.14.1	The System should be centralised. Hydraulic Tank shall be suitably located so as to provide positive suction head.	Vendor to Furnish Details			
2.14.2	Pumps, valves, accessories etc shall preferably be of Rexroth / Vickers Sperry or equivalent from a reputed manufacturer acceptable to BHEL. (Details to be submitted). The seals used in cylinders shall be of Merkel / Parker / Bushak + Shamban / Hunger / Simrit make.	Vendor to Furnish Details			
2.14.3	Suitable filtration system should be supplied for Servo Oil and other system oil.	Vendor to Furnish Details			
2.14.4	Duplex filters with changeover facility should be used	Vendor to confirm			
2.14.5	Failure indication for oil level, temperature, pressure, filter clogging should be provided	Vendor to Confirm			
2.14.6	Refrigerated type cooling system of sufficient capacity to maintain complete Hydraulic System, including servo oil etc. at a temperature not exceeding 50 deg C irrespective of the ambient conditions. Complete details should be submitted with the offer.	Vendor to Furnish Details			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.14.7	Servo valves, if any, should be mounted close to their actuators	Vendor to confirm			
2.14.8	It should be possible to hold the maximum operating pressure for some time during pressing. Suitable pressure holding system should be provided	Vendor to confirm and furnish details			
2.14.9	It should be possible to replace piston rod seals without having to dismantle the cylinders	Vendor to Confirm			
2.14.10	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	Vendor to confirm			
2.14.11	Oils used for servo system should be provided with separate tank and filtration system	Vendor to Confirm			
2.14.12	Reservoir capacity (litres): For Servo System Oil, if any For Other System Oil:	Vendor to specify			
2.14.13	All oil pipelines shall be of seamless steel .	Vendor to confirm			
2.14.14	Pipelines should undergo pickling process	Vendor to confirm			
2.14.15	Pressure measuring minimess check points (preferably with ¼” BSP stud end) shall be provided for important pressure measurements from operation, trouble shooting and maintenance point of view. Two sets of handheld minimess pressure gauge of suitable range with minimess hose (1.0 to 1.5m length) also has to be supplied along with the power pack.	Vendor to confirm			
2.14.16	Type of pump, drives, Power, Flow, Pressure ratings of all pumps used in the press and its accessories should be listed and furnished in the offer. These can be approximate values and final values can depend on detailed design	Vendor to Furnish Details			
2.14.17	Sizes, material of construction of all cylinders used in the press should be furnished in the offer	Vendor to Furnish Details			
2.14.18	Overloading of pumps should not occur. Vendor to furnish details of measures adopted for the same	Vendor to Furnish Details			
2.14.19	The hydraulic power pack shall be provided with minimum number of pipes / pipe joints and as far as possible usage of manifolds / stacked valves construction is preferred.	Vendor to Confirm			
2.14.20	Suitable stand-by pump unit, filter unit, etc shall be provided for critical areas	Vendor to Furnish Details			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.14.21	The Power pack should be designed taking into account the energy efficiency (Hi-low pump system, proper unloading during idling, etc.).	Vendor to confirm and furnish details			
2.14.22	All the pipe / hose fittings shall be of standard weld nipple with O-ring seating type (DIN 3865 or equivalent) and no ferrule joints are to be used in the hydraulic system. All threaded connections shall be of metric sizes	Vendor to Confirm			
2.14.23	Suitable vibro-mounts, compensators (flexible bellows), flexible hose at the pump outlet, polypropylene pipe & hose clamps, etc are to be provided to minimize the vibration induced and transmitted to the hydraulic joints.	Vendor to Confirm			
2.14.24	The oil to be used shall be of standard ISO Viscosity Grades – 32 / 46 / 68	Vendor to Specify			
2.14.25	The maximum pressure of the system should preferably not exceed 310 bar	Vendor to Specify			
2.14.26	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	Vendor to Specify			
2.14.27	The pipelines to be painted with standard colours as per the colour coding accepted internationally for hydraulic systems.	Vendor to Furnish Details			
2.15	<b>ELECTRICAL SYSTEM :</b>				
2.15.1	415V (fluctuation + 10% / -10%), 50HZ (fluctuation +/-3 HZ), 3 Phase AC (3 wire system with out neutral) Power Supply Source will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding/earthing with details of required material is to be informed by vendor well in advance so that same could be incorporated during construction of foundation	Vendor to Confirm			
2.15.2	<b>Tropicalisation:</b> All electrical / electronic equipment shall be tropicalized	Vendor to Confirm			
2.15.3	All electrical & electronic control cabinets & panels should be dust and vermin proof	Vendor to Confirm			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.15.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to Confirm			
2.15.5	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.	Vendor to Confirm			
2.15.6	Motors shall conform to IEC or Indian Standards . Make of motor should be furnished by vendor in the offer	Vendor to furnish			
2.15.7	Motors shall be Energy Efficient type	Vendor to Confirm			
2.15.8	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.	Vendor to Confirm			
2.15.9	All cables shall be with multi strand copper conductors	Vendor to Confirm			
2.15.10	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to Confirm			
2.15.11	In-cycle hour counter with reset facility is to be included in the offer.	Vendor to Confirm			
2.16	<b>SAFETY ARRANGEMENTS:</b> <b>Following safety features in addition to other standard safety features should be provided on the machine:</b>	Vendor to Confirm			
2.16.1	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on display and panels) should be available.	Vendor to Confirm and furnish details.			
2.16.2	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to furnish details.			
2.16.3	All the pipes, cables etc. on the machine should be well supported and protected.	Vendor to Confirm			
2.16.4	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor to Confirm			
2.16.5	Rotating couplings shall be provided with suitable guards	Vendor to Confirm			
2.16.6	Emergency Switches at suitable locations as per International Norms are to be provided.	Vendor to Confirm			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
2.16.7	Oil & water pipe lines should not run with electrical cable in the same tray / trench.	Vendor to Confirm			
2.16.8	Failure of any control should not result in a hazardous situation (Fail Safe mode)	Vendor to Confirm			
2.16.9	Interlocks should be provided to ensure that the press / job transport system / job manipulator start, stop, and operate in safely designed sequence and no malfunction / safety hazard should result due to accidental operation of a switch or control.	Vendor to Confirm			
2.16.10	Safety arrangements to be followed during maintenance of the press and its accessories should be clearly defined	Vendor to furnish details			
2.16.11	Suitable provision should be made to prevent dropping down of the ram in case of failure of oil pressure in any of the return cylinders or failure of power supply	Vendor to furnish details			
2.16.12	Fail safe features to be built-in to protect the press and operating personnel from any hazard in the event of failure of hydraulic oil pressure or electric power supply	Vendor to furnish details			
2.16.13	Manually operated shut-off valves and other valves important for safe operation of the press and its accessories should be provided with suitable sensors to signal their status for safe control of operation & operating sequence	Vendor to Confirm			
2.16.14	The ram should descend only when the job is located in one of the selected position in normal pressing mode. However, in setting mode, it should be possible to operate the ram at slow speed, irrespective of the job position.	Vendor to Confirm			
2.16.15	The ejector should remain in the home position and become non-functional during the shell forming operation.	Vendor to Confirm			
2.16.16	If large quantum of oil is stored or present on the press (e.g pre-fill tank), the same should be drained quickly into the main tank in the event of fire. Necessary provision should be made in the press for this purpose.	Vendor to furnish details			
2.16.17	Safety Lights at both ends of moving job loading system (preferably Flashing during travel).	Vendor to furnish details			
2.17	<b>ENVIRONMENTAL PERFORMANCE OF THE MACHINE :</b> <b>The Machine shall conform to following factors related to environment:</b>				

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2.17.1	Maximum noise level shall be 85 dB(A) at the control desk at normal load condition, with correction factor for back ground noise. This will be measured as per international standards like DIN 45635-16. Supplier to demonstrate compliance to noise level, if so required.	Vendor to confirm and furnish details			
2.17.2	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to confirm and furnish details			
2.17.3	Paint of the machine should be oil resistant and should not peel off and mix up with oil.	Vendor to confirm and furnish details			
<b>3.0 SERVO VOLTAGE STABILIZER:</b>					
3.1	Indian make Air Cooled servo Controlled Voltage Stabilizer with no undesirable Harmonics in the stabiliser output, should be suitable for the control system shall be supplied.	Vendor to confirm			
3.2	Make	Vendor to Specify			
3.3	Model & Rating	Vendor to Specify			
3.4	Catalogue of the Voltage Stabiliser shall be submitted with the offer.	Vendor to Specify			
<b>4.0 ULTRA ISOLATION TRANSFORMER</b>					
4.1	Indian make Ultra Isolation Transformer shall be supplied suitable for the controls	Vendor to confirm			
4.2	Make	Vendor to Specify			
4.3	Model and Rating	Vendor to Specify			
4.4	Catalogue of the Ultra Isolation Transformer shall be submitted with the offer.	Vendor to Specify			
<b>5.0 HYDRAULIC OPERATED SERVICE LIFT:</b>					
5.1	Suitable Electric / Hydraulic operated, mobile service lift shall be offered for carrying out maintenance at heights	Details & catalog to be furnished with the Offer			
5.2	It should be suitable for carrying two persons and minimum service tools	Vendor to confirm			
5.3	Height of lift (m)	Vendor to Specify			
5.4	Outreach (m)	Vendor to Specify			
5.5	Weight carrying capacity (Kgs)	Vendor to Specify			
5.6	Make	Vendor to Specify			
5.7	Model	Vendor to Specify			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
<b>6.0</b>	<b>PNEUMATIC SYSTEM:</b>				
<b>6.1</b>	Details of Pneumatic system, if any, should be furnished.	Vendor to furnish details			
<b>6.2</b>	The system shall be suitable for operation on BHEL compressed air supply having pressure of max 4 bar	Vendor to Confirm			
<b>6.3</b>	Refrigerated type Dryer & Filter of suitable capacity for the total compressed air requirements of the machine & accessories and to suit required air quality should be supplied.	Vendor to furnish details			
<b>6.4</b>	Make & Model of Refrigerator type Dryer.	Vendor to Specify			
<b>6.5</b>	Quantity of air required (cfm)	Vendor to Specify			
<b>6.6</b>	Pneumatic elements shall be of reputed makes like Festo, Parker etc	Vendor to Specify			
<b>7.0</b>	<b>DIAGNOSTIC SYSTEM:</b>				
<b>7.1</b>	<b>TELE-DIAGNOSTIC SERVICE :</b>				
<b>7.1.1</b>	Tele-diagnostic service should be provided through International telephone lines along with required Hardware / Software package for the supplied PLC system for remote diagnosis and correction of the problems in PLC of the machine. This should be provided free of charge for the guarantee period. Terms and conditions for the service after guarantee period should be informed by vendor. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future.	Vendor to Furnish details			
<b>7.2</b>	<b>FAULT DIAGNOSTIC SYSTEM:</b>				
<b>7.2.1</b>	Supplier's own diagnostic system with required hardware and software should be supplied and installed. This should include customised auto-diagnostic system with supporting hardware and software which shows detailed cause and remedy for the fault on the display with full graphic diagnostic help for faults related to mechanical and electrical systems.	Vendor to Furnish details			
<b>7.3</b>	Help guide should be provided to use both diagnostic systems	Vendor to confirm			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
<b>8.0</b>	<b>LEVELING &amp; ANCHORING SYSTEM</b>				
<b>8.1</b>	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc shall be supplied for the press	Vendor to confirm			
<b>9.0</b>	<b>TOOLS FOR ERECTION, OPERATION &amp; MAINTENANCE :</b>				
<b>9.1</b>	Special tools and equipment required for erection of the machine shall be brought by the vendor. Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc.for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer	Vendor to Furnish			
<b>9.2</b>	Tie rod pre-tensioning device with its hydraulic power pack should be supplied along with the machine	Vendor to confirm			
<b>10.0</b>	<b>SPARES:</b>				
<b>10.1</b>	Itemised breakup of mechanical, hydraulic, electrical and electronic spares used on the machine and accessories in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: <b>(Unit Price of each item of spare should be offered)</b>	Vendor to provide List			
	<b>a) Mechanical &amp; Hydraulic Spares:</b> All types of pumps, Valves, pressure switches / transducers, filters, seals etc	Vendor to provide List			
	<b>b) Electrical /Electronic / PLC Spares:</b> All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Operator's panel with Display Unit, I/O Cards for PLC, CPU card, Control cards for servo valves etc.	Vendor to provide List			
<b>10.2</b>	All types of spares for total machine and accessories should be available for atleast ten years after supply of the machine. If machine parts 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	Vendor to provide List			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
10.3	Vendor to confirm that complete list of spares for machine and accessories, along with specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine	Vendor to provide List			
11.0	<b>DOCUMENTATION :</b>				
11.1	<b>TO BE SUPPLIED ALONG WITH MACHINE: Five sets of following documents (Hard copies) in English language should be supplied along with the machine</b>	Vendor to confirm			
11.1.1	Operating manuals of Machine & PLC system				
11.1.2	Programming Manuals of Machine & PLC system				
11.1.3	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also				
11.1.4	Maintenance, Interface & commissioning manuals for PLC system.				
11.1.5	Manufacturing drawings for all supplied maintenance accessories, pressing tool support fixtures etc.				
11.1.6	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.				
11.1.7	Detailed specification of all rubber items and hydraulic/lube fittings				
11.1.8	Operating Manuals, Maintenance Manuals & Catalogues for supplied Voltage Stabilizer, Isolation Transformer, and supplied Accessories.				
11.1.9	PLC program print-outs with comments in English.				
11.1.10	PLC program & PLC data on CD.				
11.1.11	Complete back-up of PLC program and clear written Instructions (3 copies) to take back-up and for reloading the program.				
11.1.12	Complete Master List of parts used in the machine shall be submitted by the vendor.				
11.1.13	One additional set of all the above documentation on CD ROM, wherever possible.				

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<b>11.2</b>	<b>DOCUMENTS TO BE FURNISHED ALONG WITH OFFER:</b> Two sets of following documents (Hard copies) in English language should be supplied along with the technical offer:	Vendor to Furnish			
<b>11.2.1</b>	General Arrangement drawing of the Press				
<b>11.2.2</b>	Tooling Arrangements				
<b>11.2.3</b>	Hydraulic Line Diagram and explanation of the hydraulic system				
<b>11.2.4</b>	Operating Sequence- Pictorial & descriptive explanation of various stages involved in hot pressing of a U-Shell, Hemispherical / Semi-ellipsoidal Dished End; and cold pressing, calibration of U-Shell				
<b>11.2.5</b>	Electrical Schematic Diagram and explanation of the electric / electronic system				
<b>11.2.6</b>	Operator Controls and Operator Desk Schematic				
<b>11.2.7</b>	Functional description of the various subsystems of the press, accessories and tooling with sketches where possible.				
<b>11.2.8</b>	Description of the diagnostic systems offered				
<b>11.2.9</b>	Other details as requested against respective clauses of this specification				
<b>11.3</b>	Vendor to confirm that Drawing of General Arrangement / Systems requiring BHEL approval shall be submitted in the event of an order. These drawings shall be mutually agreed to during technical discussions	Vendor to confirm			

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<b>12.0</b>	<b>TRAINING:</b>				
<b>12.1</b>	BHEL Persons should be trained at supplier's Works for mutually agreed period in the area of (a) Maintenance of Electrical & Electronic Controls, including PLC (b) Maintenance of Mechanical & Hydraulic Systems (c) Operation & Safety	Vendor to confirm			
<b>12.2</b>	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	Vendor to confirm			
<b>12.3</b>	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.	Vendor to confirm			
<b>12.4</b>	Vendor to quote for training on man day basis	Vendor to confirm			
<b>13.0</b>	<b>FOUNDATION:</b>				
<b>13.1</b>	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI). The Layout should consist of all requirements pertaining to complete the press machine and all accessories, including space requirement for Voltage Stabilizer, Isolation Transformer, & any other accessory. Soil condition data will be furnished by BHEL along with the approval. Complete Foundation Design including details, like Static/ Dynamic load details etc. and final Layout Drawings shall be submitted by the supplier within three months after getting BHEL's approval for the preliminary layout. . BHEL shall construct complete foundation for the machine. Vendor should arrange equipment required for the testing of foundation, if required by the vendor. The vendor shall also indicate detailed specifications of grouting compound and grouting procedure etc. for foundation bolts of the machine	Vendor to confirm and furnish details			
<b>14.0</b>	<b>ERECTION &amp; COMMISSIONING</b>				
<b>14.1</b>	Supplier shall be responsible for carrying out the erection, start up, testing and commissioning of the press. Required technical personnel and labour required for the same shall be provided by the vendor. Tools, tackles, mobile cranes / lifting derricks etc shall also be arranged for by the vendor. Service requirement like power, air & water shall be provided by BHEL at only one point indicated by supplier in their foundation/layout drawings.	Vendor to confirm			

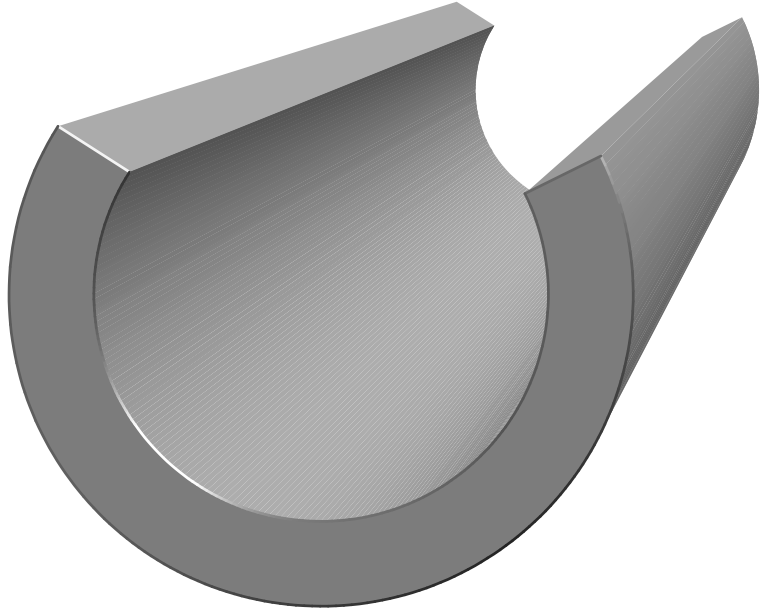
<b>SNO</b>	<b>DESCRIPTION FOR BHEL REQUIREMENT</b>	<b>BHEL SPEC</b>	<b>OFFER</b>	<b>DEVIATIONS</b>	<b>REMARKS</b>
14.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer shall also be responsibility of the vendor.	Vendor to confirm			
14.3	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, as mentioned at <b>clause 18</b> (Machine Acceptance) shall form part of the commissioning activity.	Vendor to confirm			
14.4	Testing equipment required for checking the geometrical accuracies of the press shall be arranged for by the vendor	Vendor to confirm			
14.5	Spares required during commissioning should be supplied free of cost	Vendor to confirm			
14.6	All Cover Plates required for the machine and its peripherals including pits, if any, shall be supplied and installed by the vendor.	Vendor to confirm			
14.7	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 colours of paint used.	Vendor to confirm			
14.8	Duration, terms & conditions for E&C should be furnished in detail separately by vendor along with offer. Charges for the same should be indicated in the price bid	Vendor to furnish			
14.9	Schedule of Erection and Commissioning shall be submitted after placement of order	Vendor to confirm			
<b>15.0</b>	<b>ACCURACY TESTS:</b>				
<b>15.1</b>	<b>GEOMETRICAL ACCURACIES :</b>				
15.1.1	Geometrical Accuracy Tests shall be in accordance with relevant standard. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall also be submitted with the offer.	Vendor to Furnish			
15.1.2	Above accuracies to be demonstrated to BHEL engineers during Commissioning at BHEL Works.	Vendor to confirm			

SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
<b>16.0</b>	<b>OPERATING CONDITIONS :</b>				
<b>16.1</b>	<p>Total machine including PLC system and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies.</p> <p>Power Supply:  Voltage: 415 V (with likely fluctuation of - 10%, +10% )  Frequency: 50 Hz (with likely fluctuation of +3%, - 3%)  No. of phases = 3 (3-Wire System with earth but no neutral wire)  Ambient Conditions: Temperature = 20 to 45 degree celsius  Relative Humidity = 95% max.</p>	Vendor to Confirm			
<b>16.2</b>	Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Max. ambient temperature variation is up to 25 deg Celsius in 24 hours.	Vendor to confirm			

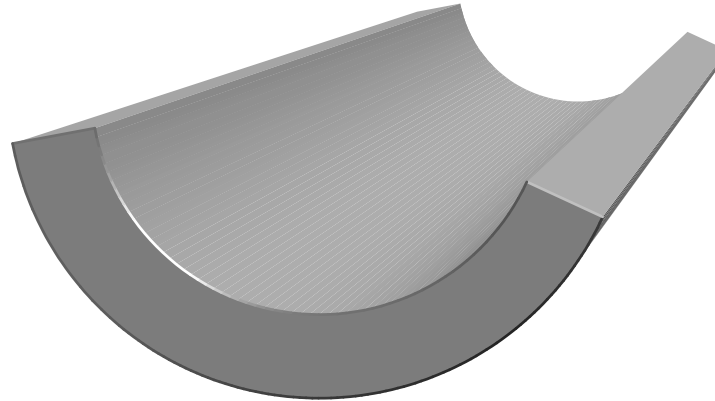
SNO	DESCRIPTION FOR BHEL REQUIREMENT	BHEL SPEC	OFFER	DEVIATIONS	REMARKS
<b>17.0</b>	<b>PROVEOUT OF BHEL COMPONENTS :</b>				
<b>17.1</b>	Vendor to carry out pressing of four U-shells (both hot bending and cold calibration) and two dished ends, of any size within the specification, at BHEL works, to the specified accuracy. Material for the proveout components shall be provided by BHEL. Vendor shall be fully responsible for proveout components as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL. Clarifications, if any required by vendor, regarding accuracy requirements of the proveout components, whether specified or not, should be discussed and got clarified by vendor during initial technical discussions.	Vendor to furnish			
<b>17.2</b>	Vendor shall be responsible for any deviation/rejection in proveout component due to wrong operation or malfunctioning of the press during pressing. The cost of such deviation / rejection, if any, shall be refunded by the vendor to BHEL.	Vendor to Confirm			
<b>18.0</b>	<b>MACHINE ACCEPTANCE: (Tests/Activities to be performed by Vendor)</b>	Should be accepted & confirmed by Vendor			
<b>18.1</b>	<b>Tests/Activities to be carried out at supplier's works in the presence of BHEL Engineers before dispatch :</b>				
<b>18.1.1</b>	Physical Inspection of all components of the press & accessories	Vendor to Confirm			
<b>18.1.2</b>	Welding test certificates	Vendor to Confirm			
<b>18.1.3</b>	Test certificates for pumps and motors	Vendor to Confirm			
<b>18.1.4</b>	Graphic Simulation of entire hydraulic circuit	Vendor to Confirm			
<b>18.1.5</b>	Graphic simulation of press Operation Sequence	Vendor to Confirm			
<b>18.1.6</b>	Graphic simulation of bending of shell complete with operation of job transport system and job manipulating device	Vendor to Confirm			
<b>18.2</b>	<b>Test/ Activities to be carried out at BHEL works while commissioning the machine :</b>				
<b>18.2.1</b>	Demonstration of all features of the machine	Vendor to Confirm			
<b>18.2.2</b>	Continuous running for a shift of 8-hours to observe for any abnormal temperature rise, abnormal operation	Vendor to Confirm			
<b>18.2.3</b>	Job prove out.	Vendor to Confirm			

<b>SNO</b>	<b>DESCRIPTION FOR BHEL REQUIREMENT</b>	<b>BHEL SPEC</b>	<b>OFFER</b>	<b>DEVIATIONS</b>	<b>REMARKS</b>
<b>18.2.4</b>	Training of BHEL operation and maintenance personnel by the supplier's experts / engineers during their stay at BHEL works for a period of two weeks after commissioning	Vendor to Confirm			
<b>19.0</b>	<b>PACKING:</b>				
<b>19.1</b>	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 despatched in containers, all small loose items shall be suitably packed in boxes	Vendor to confirm			
<b>20.0</b>	<b>GUARANTEE :</b>				
<b>20.1</b>	24 months from the date of acceptance of the machine.	Vendor to confirm			
<b>21.0</b>	<b>GENERAL : The vendor should submit the following information:</b>				
<b>21.1</b>	Machine Model	Vendor to specify			
<b>21.2</b>	Total approximate connected load (KVA):	Vendor to specify			
<b>21.3</b>	Approximate Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to specify			
<b>21.4</b>	Painting of Machine/ Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to specify			
<b>21.5</b>	Approximate Total weight of the machine	Vendor to specify			
<b>21.6</b>	Approximate Weight of heaviest part of machine	Vendor to specify			
<b>21.7</b>	Approximate Weight of the heaviest assembly/ subassembly of the Machine	Vendor to specify			
<b>21.8</b>	Dimensions of largest part/ subassembly/ assembly of the machine	Vendor to specify			
<b>21.9</b>	Vendor to submit, along with offer, the reference list of customers where similar machines have been supplied mentioning the customer, Machine Model, major specifications of the supplied machine, Year of Supply etc	Vendor to provide			
<b>21.10</b>	Detailed catalogues , sketch/ photographs of the press and accessories/ attachments should be submitted with the offer.	Vendor to Confirm			

<b>SNO</b>	<b>DESCRIPTION FOR BHEL REQUIREMENT</b>	<b>BHEL SPEC</b>	<b>OFFER</b>	<b>DEVIATIONS</b>	<b>REMARKS</b>
21.11	Hydraulic, Pneumatic & oil pipings should be preferably metallic except places where flexible pipings are essential. All the pipes required for the same shall be included in the standard scope of the machine.	Vendor to Confirm			
21.12	All elements of the press like valves, solenoids, motors, hoses etc should have permanent name plates / labels for clear identification	Vendor to Confirm			
21.13	All sliding surfaces should be lubricated by a centralized automatic lubrication system	Vendor to Confirm and furnish details			
21.14	Lubrication of bushings & bearings should be suitable for high temperature encountered in presses of this type	Vendor to Confirm			
21.15	First filling of required Grease should be supplied by vendor. Indigenous (Indian) source or Indian equivalent specifications of greases are also to be provided by the vendor.	Vendor to confirm and furnish details			



**'U' Shell with  
INCLUDED ANGLE 230°**



**'U' Shell with  
INCLUDED ANGLE 150°**

**DRUM HEMI-SPHERICAL DISHED ENDS**



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BHEL, Tiruchirappalli**