BHARAT HEAVY ELECTRICAL LIMITED
Centralised Stamping Unit
Bharat Heavy Electricals Limited
Industrial Area jagdishpur, District: Sultanpur
Uttar Pradesh-227817 (India)
Ph: -+91-5361-271378
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Enquiry No. :
Due Date :
Vendor Qtn. No.:

CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL (FROM PURCHASE DEPTT.)

Date :

Specification No: BHEL/CSU/1600T_TS_R0

SPECIFICATION CUM COMPLIANCE CERTIFICATE FOR 1600 TON MECHANICAL POWER PRESS

NOTE:-

1. Vendor must submit complete information against Qualification Criteria mentioned against clause no. 44.0 of this technical specification. The offer meeting this clause would only be processed.

2. The "Offered" 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.

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

NAME & ADDRESS OF THE Vendor :	**NAME & ADDRESS OF THE INDIAN AGENTS(if any) :**
TELEPHONE NOS.:	**TELEPHONE NOS.:**
FAX NOS.:	**FAX NOS.:**
E-MAIL ADDRESS :	**E-MAIL ADDRESS :**
DUNS NO. (Of Duns & Bradstreet of USA)	
SCOPE: DESIGN, MANUFACTURE, TESTING AT VENDOR'S WORKS, SUPPLY, ERECTION & COMMISSIONING AND PROVING AT BHEL SITE OF 1600 TON MECHANICAL POWER PRESS COMPLYING WITH SPECIFICATION AS BELOW	

TECHNICAL SPECIFICATIONS OF 1600T MECHANICAL POWER PRESS						
Sr. No.	**Description for BHEL requirement**	**Unit**	**Specified/ to be confirmed by**	**Offered**	**Deviation**	**Remarks**
1.0	**REQUIREMENT**					
1.01	1600 Ton Power Press is required for manufacturing of Rim Punchings of Hydro Generator Rotors.		vendor			
1.02	Maximum Sheet Thickness to be cut on press	mm	0.5 to 5			
2.0	**PRESS TECHNICAL DATA**					
2.01	Press Type		4 Cranks or crank less single action, four point suspension, eccentric gear type Power Press.			
2.02	Drive Type		Twin Drive with double gearing			
2.03	Press capacity	Ton	1600			
2.04	Rated distance from Bottom of the press	mm	12			
2.05	Number of slide suspension	No.	4			
2.06	Maximum Shut Height [Stroke down Adjustment Up (SDAU)] from bolster top face to slide bottom face	mm	1270			
2.07	Slide stroke	mm	160			
2.08	Slide adjustment	mm	300			
2.09	Strokes per minute	spm (Strokes/Minute)	20 to 30			
2.10	**Bolster Size (LR x FB)**	mm	3600x2000			
2.11	Slide Size (LR x FB)	mm	3600x2000			
2.12	**Bolster type and number of bolster:**		**Fixed/Movable (Qty. : 1 Unit) Note: Provision of suitable movable bolster may be kept for quick Die Change in place of QDS mentioned at Clause No.28**			
2.13	Thickness of Bolster	mm	200 (Approx.)			
2.14	**Type of Frame**		Steel Tie Rod Type			
2.15	Height of Bolster top face from floor level (Approx.)	mm	600 preferably, supplier to specify			
2.16	Height of Frame above the Floor	mm	Vendor to specify			
2.17	Floor Space (LR x FB)	mm	Vendor to specify			
2.18	Gross Weight of Press	Kg.	Vendor to specify			
2.19	Hydraulic Overload Protection Device		Vendor to provide			
2.20	Main Slide Guiding		Adjustable 8 point flat guides with renewable bronze liners			
2.21	**Clutch & Brake**		Hydraulic Combined Clutch & Brake (Make Ortlinghaus or equivalent)			
2.22	**Counter Balance Cylinders**		Vendor to provide, Pneumatic type			
2.23	Centralized Lubrication System		Vendor to provide, Re-circulating oil lubrication			
2.24	SPM Indicator		Vendor to provide			
2.25	Die Height Indicator		Vendor to provide			
2.26	Slide Stroke Indicator		Vendor to provide			
2.27	Noise Level (Peak Impulse)	dB(A)	85			
2.28	Control voltage		110 V AC and 24V DC for PLC input/output-signals			
2.29	**Electrical controls**		Trough PLC & MMI (Siemens/Allen Bradley make)			
2.30	**Main motor power (AC)(approx.)**	**kW**	Vendor to specify			

Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
2.31	Press accuracies for perpendicularity, Parallelism and flatness		As per JIS B 6402 -1985 Grade-I or equivalent national/ international Standard			
2.32	Maximum Deflection of Bolster	mm/m	0.17, when full pressing Load applied uniformly and symmetrically over 2/3 rd LR and full FB dimension of bolster			
2.33	**Air Pressure**	kg/sq. cm	Vendor to specify			
2.34	**Portable operatoion stand**		Both hand operation type with emergency stop button in middle-2 Nos.			
2.35	**Knockout Mechanism**		Vendor should provide a provision of knock out mechanism (Knockout rod & Tie bar) in press operating on upstroke of the press which will eject out work pieces/blanks from the Die. The layout of the Knockout holes shall be provided by vendor			
2.36	**Details of T- slots in bolster and Slide:** **No. of Slots, Pitch of slots and size of T-slots**		**Vendor to provide.** **Refer Annexure-D for Pitches of T-slots.** **Refer Annexure-C for size of T-slots.**			
2.37	**Opening in the bed (LRxFB)**	mm	**1000x800** **Refer Annexure-D for details**			
3.00	**CONSTRUCTION**					
	Four piece welded steel box type rod construction is used for maximum rigidity. The press should be of all steel construction fabricated from high quality rolled steel plates of fusion welding quality with heavy cross ribbed and stiffened, fully thermal stress relieved prior to machining. The box type crown gives maximum support for the eccentric shaft and bearings under heavy-duty load conditions. The uprights are designed to reduce deflection and vibration to a minimum, thus providing the benefits of less die wear, greater part accuracy and longer Press life. In machining, the square ness of uprights to the bed should accurately maintained for maximum slide to bed parallelism. The crown and bed with uprights between them are tied together by tightening tie rods with pre-stressing to 150 % of the nominal press capacity forming a very rugged Press frame. Material is C45 forging / equivalent & single piece Construction.		Vendor			
4.00	**RAM SLIDE**					

Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
	The ram slide should be Air Counter balanced and shall be adjusted by double worm gears working simultaneously. A clear visible scale for reading the adjustment range of the ram slide shall be fitted on the slide. Air Counter balance system should be suitable to work on a compressed air supply from compressor supplied along with machine.		Vendor			
5.00	**TRANSMISSION DRIVES**					
	The drive should be transmitted from flywheel to slide through eccentric shaft & gears. The main motor shall foot mounted AC motor, suitable for operation on 415V/3phase/50Hz power supply. The motor drive arrangement shall complete with adjustable motor mounting bracket etc.		Vendor			
6.00	**BEARINGS:**					
	Precision fitted, thick walled bronze bearings should be used for eccentric shaft bearings and connecting Rod bearings. These should be heavily lubricated for smooth running. Anti-friction bearings shall be used for quill for flywheel mounting.		Vendor			
7.0	**FLYWHEEL:**					
	The flywheel rotates on anti-friction bearings and has enough energy content to perform the desired type of work within the capacity of the press. Fly wheel metal mesh guard for V-belt drive shall be provided for safety. The flywheel shall be mounted on quill, thus avoiding load on drive shaft.		Vendor			
8.0	**CLUTCH & BRAKE UNIT:**					
	The press should be equipped with pneumatically operated combined clutch and brake unit of **OMPI, Italy** make/ **Ortlinghaus** make prefereably (or equivalent standard). The mounting of clutch and brake unit shall so design as it gives easy accessibility for inspection, adjustment and maintenance. The system shall be complete with all accessories viz. checks valve, pressure regulator and safety valve etc. as required for proper operation of clutch and brake unit.		Vendor			
9.0	**SLIDE:**					
	The slide should be fabricated from rolled steel plates conforming to IS: 2062 or equivalent standards into a rigid box section with adequate stiffeners and direct load bearing plates to ensure strength and rigidity. The fabricated slide shall be fully thermal stress relieved prior to machining. Long guide ways should machined square with the slide face and fitted with bronze liners machined accurately for precise alignment and proper guiding. all critical welds shall be die penetration tested.		Vendor			
10.0	**GIBS:**					
	Precise slide guiding should be maintained by a-point flat gibbing arrangement. All gibs are accurately squared with the press bed and set properly. The long gibs keep the slide fully guided within the gibs throughout the stroke from minimum to maximum shut height. This assures excellent slide to bed parallelism at all times.		Vendor			
11.0	**SHUT HEIGHT ADJUSTMENT:**					
	Shut height adjustment screws should be driven through worm wheel drive. A brake motor powers the drive shall be provide a creep free shut height adjustment mechanism. Digital type of shut hieght indicator is preffered.		Vendor			
12.0	**SLIDE COUNTERBALANCING CYLINDERS:**					

Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
	Pneumatic counter balancing cylinders balance the weight of the complete slide assembly and upper tooling, taking up all bearing clearances shall reduce shock and vibration during press operation. They also reduce the power required to lift the slide with suitable upper tooling weights. Complete piping, gate valve, check valve, surge tanks, pressure regulator and air pressure switches should be provided with counterbalancing cylinders.		Vendor			
13.0	**LUBRICATION:**					
	The press must be provided with centralized, re-circulating type oil lubrication system.		Vendor			
14.0	**ELECTRICAL CONTROLS:**		Vendor			
	The electrical system must be suitable for operation on 415 ± 10 %, 3 phase, 3 wire 50 Hz ± 3% AC supply. The necessary transformer for stepping down to lower voltages for control etc. fuses, terminal bars contactors, indicators and other auxiliaries are to be included in the offer. The control voltage should be 110V AC and 24V DC for PLC input / output signals. Main control cabinet is of remote, floor-mounted type. Cabinet houses main disconnect switches, PLC, main and branch fuses, control transformer, clutch control relays etc. as applicable. All necessary electrical interlocks are to be incorporated as required for safe press operation.		Vendor			
15.0	**CAM LIMIT SWITCH:**					
	The press should be supplied with standard make Cam Limit Switch for accurate operation of the press. The cam angles are to be adjustable.		Vendor			
16.0	**STROKE COUNTER:**					
	Press should be with a six-digit stroke counter with resetting facility.		Vendor			
17.0	**AIR COMPRESSOR UNIT:**					
	Air compressor, air dryer, air reciever, connecting hoses/pipes, valves, pressure switches etc. of suitable type and capacity to be supplied along with the machine. The air delivery of compressor shall meet all the air requirement of machine. Vendor to ensure the quality of air supplied by compressor shall be suitable to machine under operation. all pressure valves, pressure guages,pressure switches, hose pipes, pneumatic controls etc. required for smooth and trouble free running of compressor shall be provided by the vendor. vendor to include spares for two years of trouble free working of air compressor in his offer.		vendor			
18.0	**PNEUMATIC CONTROLS:**					
	The air supply to surge tanks of counter balance cylinders shall be through a manifold. Pneumatic control consists of controls for Clutch & Brake, Counter Balance Cylinders & Flywheel Brake with appropriate filters and lubricators as well as pressure switches. All the controls should be neatly arranged in a pneumatic panel.		Vendor			
19.0	**FLYWHEEL BRAKE:**					
	Pneumatically operated flywheel brake should be provided to stop flywheel. It should be applied as long as the actuating push button is manually pressed.		Vendor			
20.0	**HYDRAULIC OVERLOAD SAFETY DEVICE:**					

Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
	This overload safety device must be provided for protecting the press structure against overloading thus ensuring the safety of press and tooling. A hydraulic chamber, in the load path of the press mechanism shall be pre-charged to a pressure for desired tonnage (maximum tonnage being equal to rated capacity of the press). The hydraulic chamber should be pressurized by hydraulic power pack. In the event of overloading, overload valve actuates, allowing oil to escape from the hydraulic chamber. A lamp on main control station immediately gives the overload indication by pressure switch and the press stops within the braking angle.		Vendor			
21.0	**SAFETY:**					
	The following safety features shall be provided with the press:		Vendor			
21.1	**a) TO OPERATOR:**					
21.1.1	Emergency stop button provided within easy reach of operator.		Vendor			
21.1.2	Control panel power cabinet doors will not open till electric supply shall be disconnected from the main isolator switch.		Vendor			
21.1.3	Press will not start till such time as the power cabinet doors should be closed and the main isolator switch shall be placed in the 'ON' position.		Vendor			
21.1.4	Control voltage should be 11OV for operator safety and 24V DC for PLC input / output signals.		Vendor			
21.1.5	Safety guards to operator ensuring operation of press only when their hands/ body parts are away from damage area. refer Annexure-III for details		Vendor			
21.1.6	Sound enclosure may (If required) to be offered as an accessory.		Vendor			
21.1.7	Any other saftey as required		Vendor			
21.2	**b) TO MACHINE: -**					
21.2.1	Dual safety valve provided for clutch and brake unit.		Vendor			
21.2.2	Overload protection system to prevent the press from overloading		Vendor			
21.2.3	Overload safety for electrical system from overloading		Vendor			
21.2.4	Visual indication in case of filter clogging.		Vendor			
21.2.5	To minimize leakage flange type connections are used for bigger size pipes (normally above 1" SSP connection).		Vendor			
21.2.6	Visual indication in case of rise in temperature above 60 Degree Celcius		Vendor			
21.2.7	Visual indication for low oil level in hydraulic tank		Vendor			
21.2.8	Single Phase Preventer		Vendor			
22.0	**MAINTENANCE:**					
22.01	All the parts of the equipment should have easy accessibility for maintenance work, inspection and repair work.		Vendor			
22.02	Any special tools required for maintenance and repairs for the machine should be indicated and the same shall be offered along with the equipment.		Vendor			
22.03	Service manual should be supplied, with blow-out diagram of mechanical items.		Vendor			
22.04	The electrical/electronic circuit diagrams including PCB details must be provided.		Vendor			
23.0	**PAINTING:**					
	The machine should be painted to **DIN RAL 6011 apple green**.		Vendor			
24.0	**MODE OF OPERATION**					
	Press should be possible to set the following three mode of operations: **a) Inching** **b) Single auto cycle** **c) Continuous auto cycle**		**Vendor**			
25.0	**FIRST FILLING OF OIL**					

Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
	The first filling of all types of oils used in press shall be in the scope of Vendor. Vendor shall indicate grade and quantity of oil(s) of standard make(Indian Oil/ Castrol etc.) for future procurement.		Vendor			
26.0	**COOLING / HEATING EQUIPMENT**					
	Refrigeration type cooling and heating (if required) equipment for re-circulating lubricating oil and hydraulic system oil suitable for press to operate under above men¬tioned temperature conditions shall be quoted giving full technical details .		Vendor			
27.0	**SPARES:**					
	List of spare parts for mechanical / electrical / electronic equipment and control system, lubricating, pneumatic and hydraulic system for two years of trouble free operation of press and its accessories shall be quoted with complete breakup of prices, specifications along with manufacturer's catalogue. The following spares shall also be quoted with price break up of each :- - Spares for PLC & MMI system, PLC CPU, PLC power supply - Spares for Complete Lubrication System - Electrical Control Cabinet must have proper forced air cooling system. - Control Cabinet must have provision of a key switch to override the door interlock condition. - Input/ output board. - Set of all PCB,s for drive controller - Power thyristors / transistors pack. - Spares for position feed back devices /sensors -Linear transducers/ rotary encoders/ absolute encoders etc. - Spares for electrical control systems -Fuses, contactors, relays, timers, limit switch blocks, pressure switches, solenoid valves, flow switches, lubrication units etc. - Spares for auxiliary systems e.g. Air Compressor Unit - Set of PCB's for auxiliary system e.g lubrication system etc. List of quoted spares to be submitted alongwith the Offer		Vendor			
28.0	**STANDARD ACCESSORIES/OTHER ACCESSORIES/ ANY OTHER ITEMS/ FEATURES:**					
	The following items / accessories / features shall also be quoted , giving complete technical details alongwith necessary catalog / drawings. Unit price should be quoted separately for each item. For those items which are supplied alongwith main press as standard accessory or are its feature shall be clearly indicated against them in the offer. Any other item, which is not included in our specification, however is must for regular operation of the press shall also be offered by the vendor with technical details and price. 1. Quick Die Change System - Die loading arms, Die Lifters & Die clamps suitable for Die Weight of 7 Tons. Note : Alternatively suitable moveable bolster plate may be offered for quick die change in place of separate system 2 Hydraulic Overload Protection Device 3. Die Space light 4. Portable operation stand 5. Safety photo electric guards for operators 6. Metal mesh guard for flywheel and belts 7. Production Counter		Vendor			
29.0	**DETAILS TO BE INCLUDED IN THE OFFER:**					

Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
29.01	General arrangement drawing of the machine showing the following details: • Constructional features. • Dimensional details and capacities of items. • Details of accuracy of alignment.		Vendor			
29.02	Test chart complying JIS B 6402 -1985 Grade-I or equivalent national/ international standard		Vendor			
29.03	Technical Literature.		Vendor			
29.04	Specification of the machine offered.		Vendor			
29.05	Circuit Diagram along with details of electric and electronic equipment.		Vendor			
29.06	Type and make and capacity of motors.		Vendor			
30.0	**TECHNICAL LITERATURE & DRAWINGS TO BE SUPPLIED ALOGWITH THE MACHINE:**					
	Four copies (Three no. hard copies and one no. on CD) of all operation and maintenance manuals in English shall be supplied with the press. Maintenance manuals should contain list and speci-fications of all the parts of press. The following details shall be covered in manuals: -Detailed assembly drawings with clear marking of each component giving reference to manufacturer(s) for each assembly/ sub-assembly. -Electrical detailed circuit diagram -Hydraulic diagramme -Wiring diagramme indicating layout of plugs, junction boxes and strips. -Maintenance manual of any auxiliary system / equipment -Ladder diagramme of PLC ,cross reference list of I/O/F, I/O listings. - Detailed circuit of PCBs used. -Programming manual of PLC -Circuit diagramme of any auxiliary system/ equip¬ments. -Operation manual -List of bought out spares alongwith specifications and addresses of manufactures /vendors with their reference nos. - Reproducible masters for drawings (One master for each drawing). - Detailed catalogues and drawings for spare parts.		Vendor			
31.00	**ASSEMBLY ,TESTING & PRE DISPATCH INSPECTION AT VENDOR'S WORKS**					
31.01	The machine shall be completely installed and tested at Vendor's works and two copies of test and inspection certificates are to be furnished. BHEL Engineers may witness the test of the machine at Vendor's works.		Vendor			
31.02	Tests shall be performed to show that the machine meets the requirement of the specifications.		Vendor			
31.03	The Machine shall be dispatched only after acceptance of tests and clearance for dispatch in writing by BHEL		Vendor			
31.03	Geometrical Accuracies (All standard accuracy tests including press accuracies tests for perpendicularity, parralellism and flatness) in accordance with JIS B 6402,1985 Grade-I or equivalent national/ international standard		Vendor			
32.00	**MACHINE ACCEPTANCE:**					
32.1	**Tests/Activities to be carried out at BHEL works while commissioning the machine :**					
32.1.1	Geometrical Accuracies (All standard accuracy tests including press accuracies tests for perpendicularity, parralellism and flatness) in accordance with JIS B 6402,1985 Grade-I or equivalent national/ international standard		Vendor			

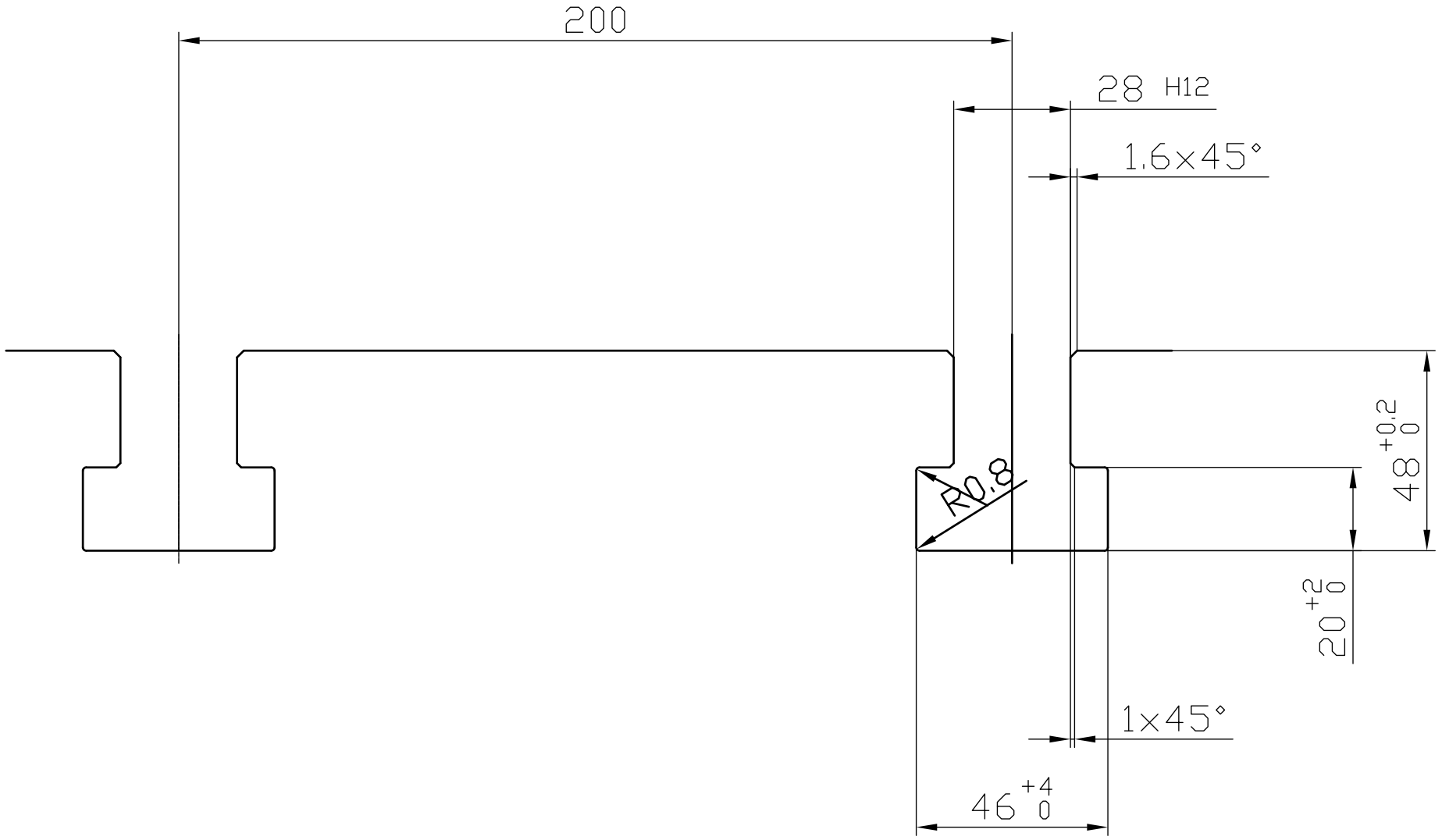
Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
32.1.2	Full load test to demonstrate the maximum power & cutting capacity of the machine.		Vendor			
32.1.3	The machine should be tested for continuous working of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.		Vendor			
32.1.4	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine		Vendor			
32.1.5	Two weeks supervision of independent operation of machine by BHEL after job proveout		Vendor			
32.1.6	**Training of BHEL machine operators in operation of complete machine & accessories etc by the Vendor's experts / engineers during their stay at BHEL works while commissioning.**		Vendor			
32.2	**PERFORMANCE TESTS AT BHEL PLANT**					
	The performance of the machine shall be checked under various operating conditions such as:		Vendor			
32.2.1	Production of various laminations (minimum 2 types) as specified by BHEL		Vendor			
32.2.2	Check for dimensional accuracy of the stampings produced.		Vendor			
32.2.3	Check for press capacity and speed of operation (strokes per minute).		Vendor			
32.2.4	Check for satisfactory operation of various systems under manual and all auto modes.		Vendor			
32.2.5	Check for operation and interlocking of control system and its visualisation by operator induced faults.		Vendor			
33.0	**PERFORMANCE GUARANTEE**					
	The Vendor shall guarantee the performance of the machine on continuous basis under shop floor working conditions as follows:		Vendor			
33.01	Press Capacity: (To be measured by a suitably calibrated press force measuring device)		Vendor			
33.02	Speed of Operation of Press : 20 to 30 Strokes/minute		Vendor			
34.0	**DRAWINGS, QUALITY ASSURANCE PLAN & PROGRESS REPORTS**					
	Vendor shall submit GA drawings , foundation drawings , electrical drawings and Quality asssurance plan with in one month from the date of place ment of LOI/Purchase Order. Vendor shall submit monthly progress reports showing progress of design, material procurement, manufacturing, assembly etc and any advancement/ delays with respect to the scheduled delivery date.		Vendor			
35.0	**PACKING:**					
	Sea worthy & rigid packing for all items of complete machine,PLC & MMI System, all Accessories and other supplied items to avoid any damage/loss in transit shall be provided. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes.		Vendor			
36.0	**FOUNDATION :**					
36.01	Vendor shall submit the preliminary foundation layout drawing along with load details for BHEL's approval. Soil condition data will be furnished by BHEL along with the approval. After approval of layout drawing, complete Foundation Design including details, like Static/ Dynamic load details etc. and final Layout Drawings shall be submitted by the Vendor. BHEL shall construct complete foundation for the machine as per instructions of the Vendor and at Vendor's responsibility. Vendor may supervise the construction of foundation if he so desires.		Vendor			

Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
36.02	The Vendor shall also indicate detailed specifications of grouting compound and grouting procedure etc. for foundation bolts of the machine. All types of foundation bolts, anchor bolts, fasteners, cover plates, gratings etc. required for erection of machine shall be supplied by vendor along with machine.		Vendor			
37.0	**INSTALLATION & COMMISIONING**					
37.01	Vendor shall be fully responsibility for carrying out the Installation, start up, testing and commissioning of machine, it's control system & all other supplies etc. Service requirement like power & water shall be provided by BHEL at only one point to be indicated by Vendor in their foundation/layout/GA drawings. Other requirements like crane and helping personnel shall also be provided by BHEL. Details of these requirements should be informed by Vendor in advance.		Vendor			
37.02	Successful completion of performance tests shall also be part of commissioning tests.		Vendor			
37.03	Tools, Tackles, instruments and other necessary equipment including Laser equipment required to carry out Installation and commissioning activities should be arranged by the Vendor.		Vendor			
37.04	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought/ arranged by the Vendor.		Vendor			
37.05	if any paint on the machine has rubbed off or peeled during transit or Installation the area should be repainted and merged with the original surrounding paint by the . For this purpose, the Vendor should supply sufficient quantity of touch-up paint of various colours of paint used.		Vendor			
37.06	Schedule of Installation and Commissioning shall be submitted with the offer.		Vendor			
37.07	Charges, duration, terms & conditions for Installation & Commissioning should be furnished in detail by Vendor along with offer.		Vendor			
37.08	Successful proving of BHEL components by the vendor shall be considered as part of commissioning. All tests for Machine Acceptance shall form part of the commissioning activity.		Vendor			
37.09	Special tools and equipment required for Installation 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			
38.0	**GEOMETRICAL ACCURACIES :**					
38.01	Geometrical Accuracies (All standard accuracy tests including press accuracies tests for perpendicularity, parralellism and flatness) shall be in accordance with JIS B 6402,1985 Grade-I or equivalent national/ international standard. Detailed Test Chart for the same, clearly showing the accuracies to be achieved on the machine, shall also be submitted with the offer.		Vendor			
38.02	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Vendors works and during Installation & Commissioning at BHEL Works.		Vendor			
39.0	**GUARANTEE**					
	The machine is to be guaranteed is respect of accuracy, design, materials, construction, performance and against any manufacturing defects for a period of Twenty four months from the date of acceptance of machine at BHEl site. Free after sales service should be provided during guarantee period.		Vendor			
40.00	**SCOPE OF SUPPLY**					
	The equipment should consist of the following: (including all items & consumables required for satisfactory commissioning & including standards & optional accessories etc. as per specification)		Vendor			

Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
40.01	Equipment as per meeting on above specification		Vendor			
40.02	Installation, Commissioned, Training & Proving.		Vendor			
40.03	Oeration & Maintenance Manuals with Circuit Diagrams. As per above specification.		Vendor			
40.04	Accessories as per above specifiaction		Vendor			
40.05	Spares for two years normal working as per above specification					
40.06	Hydraulic Die Clamp & Power pack.		Vendor			
40.07	Complete Air Compressor Unit as per above specification		Vendor			
41.0	**AMBIENT CONDITIONS & THERMAL STABILITY :**		Vendor			
	The machine including PLC & MMI system and all supplied items should work trouble free and efficiently under following operating conditions.					
41.01	**Power Supply:**		Vendor			
	Voltage: 415 V - 10%, +10%		Vendor			
	Frequency: 50 Hz +3%, - 3%		Vendor			
	No. of phases = 3 (3 wire supply without neutral)		Vendor			
41.02	Ambient Conditions: Temperature = 5 to 50 degree Celsius		Vendor			
41.03	Relative Humidity = 95% max.		Vendor			
41.04	Altitude: 600 M above Mean Sea Level		Vendor			
41.05	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. temperature variation is up to 25 deg Celsius in 24 hours.		Vendor			
41.06	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine should be ensured by Vendor.		Vendor			
41.07	The machine, including attachments and accessories, should be suitable for 24 hrs. continuous operation throughout the year.		Vendor			
42.0	**TRAINING AT BHEL PLANT**					
	The Vendor shall undertake training of Mechanical, Electronics & Control persons in operation and maintenance of the machine at BHEL's works for a period of 2 weeks after successful commissioning of the machine. The training program shall be as follows:		Vendor			
42.01	Construction and functioning of the system		Vendor			
42.02	Presentation of individual components by means of sectional views and schematic drawings		Vendor			
42.03	Safety instructions		Vendor			
42.04	Setting up of system		Vendor			
42.05	Demonstration of machine in operation		Vendor			
42.06	Resetting of system		Vendor			
42.07	Operator control of system in all operating modes		Vendor			
42.08	Programming of all required data		Vendor			
42.09	Going through all operating instructions		Vendor			
42.10	Display and control system		Vendor			
42.11	Fault location by means of programming unit		Vendor			
42.12	Electrical, Electronic & PLC & MMI maintenance for machine & other supplied equipments		Vendor			
42.13	Mechanical & Hydraulic maintenance of the machine & other supplied equipments		Vendor			
42.14	Other operational requirements		Vendor			
43.0	**PROVEOUT OF BHEL COMPONENTS :**					

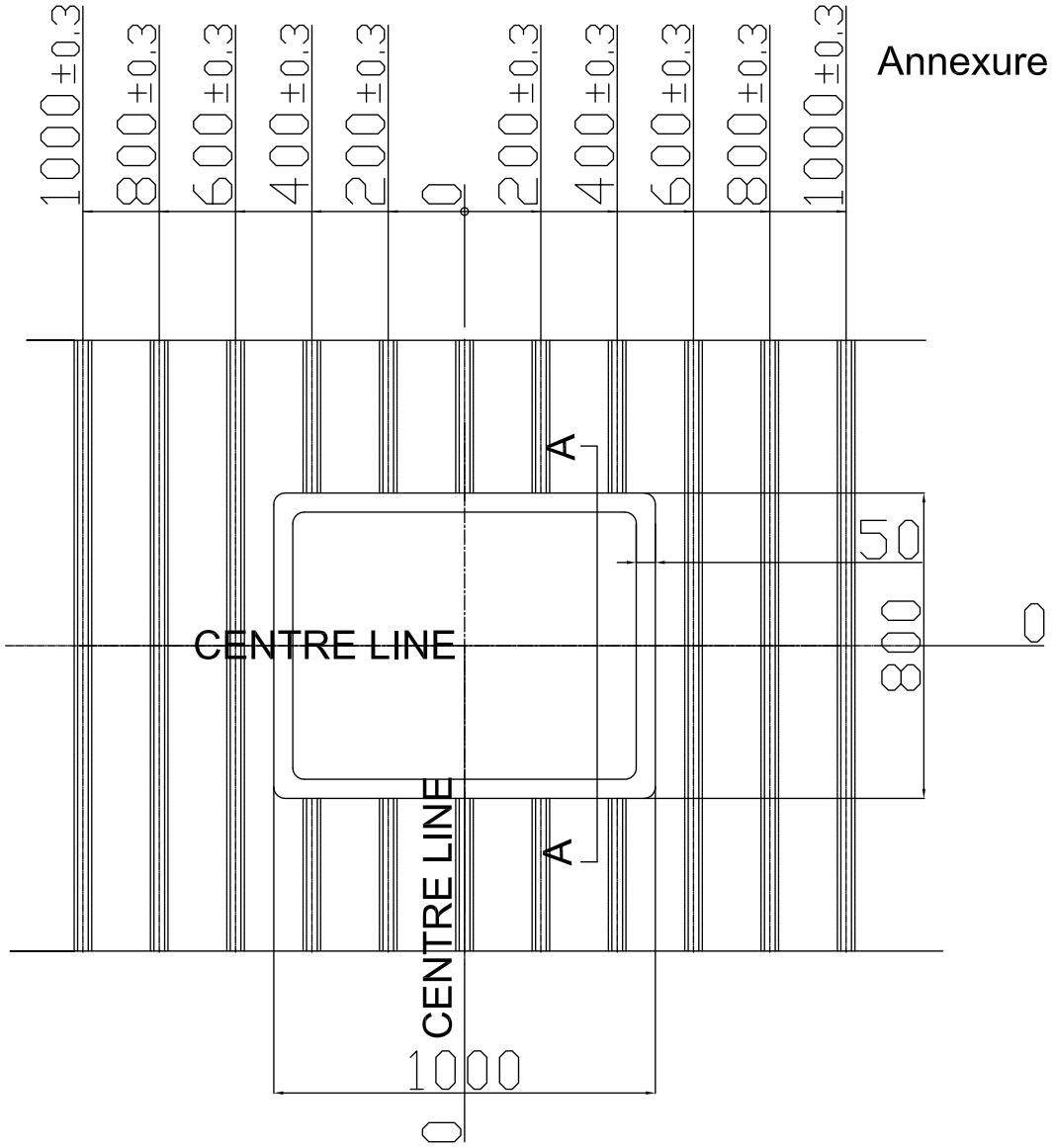
Sr. No.	Description for BHEL requirement	Unit	Specified/ to be confirmed by	Offered	Deviation	Remarks
43.01	**Vendor to prove out the machine in respect to its performance,design, accuracy and system operation as per clause no. 32 & 33 above.**		Vendor			
43.02	Vendor shall be responsible financially or otherwise for any deviation/rejection in proveout component due to malfunctioning of the machine during proveout and also for the delay due to improper recommended tooling etc.		Vendor			
44.0	**Evaluation Criteria & Qualifying requirement.**					
44.01	Only those Vendor who have manufactured, supplied and commissioned at least One 1600 T Mechanical power press or higher capacity power press in past 10 years and such press is working satisfactorily as on date of opening of tender, should quote.Vendor to submit the Performance Certificates from customers showing Month and year of commissioning whom similar machine has been supplied earlier for good performance and after sales service after one year of its commissioning and machine has been working satisfactorily as on date of opening of tender. Complete postal address with Name of contact person, Email, Telephone no., Fax No. of the customer whom the said machine is supplied should be furnished		vendor			
44.02	A list of customers with performamnce certificate and contact details to whom identical/similar machines have been supplied.		Vendor			
44.03	Equipment should meet all our above specification general clauses enclosed and bidders must furnish point-to-point replies against all the points of our above specification and general clauses enclosed failing which their offer may not be considered.		Vendor			
45.0	**GENERAL:**					
45.01	there shall not be any effulents, hazardeous smoke, fumes, chemeicals etc. coming out from machine and vendor shall ensure the safe working envoirnmental conditions while machine is in operation.		Vendor			
45.02	Vendor to provide Total Electrical Load required for Machine		Vendor			
45.03	Total weight of the press and weight of heaviest assembly and largest size consignment to be lifted during erection shall be mentioned in the quotation . The EOT crane available in shop is of 10 Ton capacity.		Vendor			
45.04	Compliance List indicating point by point compliance to BHEL technical specifications should be sent alongwith the quotation		Vendor			
45.05	All motors used in the press should be AC drives. Use of DC motor in the press to be avoided		Vendor			
45.06	Electrical cable should not be placed in the trench in which oil and water pipes are placed		Vendor			
45.07	Only metallic pipes to be used except where flexible pipe is required		Vendor			
45.08	No pump should be used in tandem		Vendor			

Annexure C



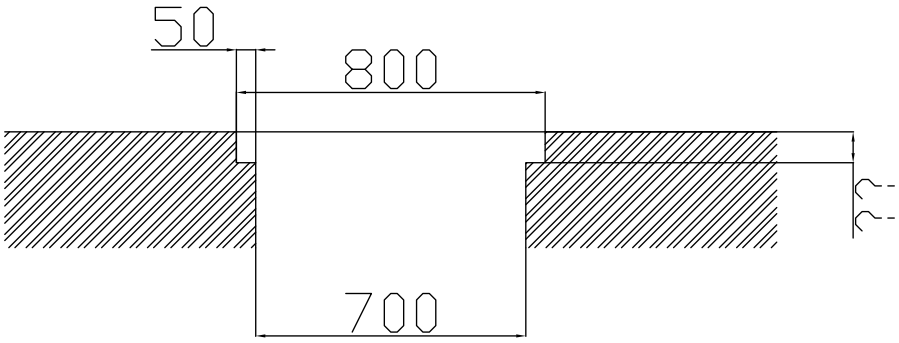
TYPICAL SECTION OF T SLOTS

Annexure D



TYPICAL SECTION OF PITCHES OF T SLOTS &
OPENING IN 1600T MECHANICAL POWER PRESS

Detail section A-A



Vendor to decide

[redacted]

[redacted]

Description:

Dual Channel Safety Guards (one for the front Side and one for the rear side) are required for 1600 Ton Power P[redacted]

The basic spec[redacted] the [redacted] are as follows:

1. S[redacted] - [redacted] 6 m[redacted]
2. P[redacted] [redacted]0 mm
3. C[redacted] 50 mm
4. A[redacted]e of di[redacted] +/ - 2 [redacted]ver
5. T[redacted]pe - [redacted].
6. [redacted] - [redacted] ms
7. S[redacted]nit - 220/110 V AC +/- 15% selectable, 48 to 55 Hz.
8. C[redacted] free 2 NO, 1 NC Relay contacts
   [redacted] 250 V AC, 5A
9. [redacted]01-4, [redacted] 4
10. [redacted]
11. [redacted] 2 - 50 [redacted]

M[redacted]

The [redacted] to very high me[redacted] v[redacted] T[redacted] bra[redacted]

By[redacted]

Suit[redacted] should be available.

[redacted]

[redacted]
a) Guard ON
b) Guard in by[redacted]
c) Individual T[redacted]e or not.

Safety Standards:

The [redacted] be mentioned along [redacted] offer.

Installation [redacted]:

The supplied system [redacted] installed, interfaced with [redacted] existing machine controls & commissioned. [redacted] ility of the system is to be proven in actual working environment to [redacted] satisfaction of BHEL.

Literature:

4 sets of detailed O&M manuals should be supplied. It should include complete electrical & elctronics circuit diagrams and PCB details.

Warranty:

Warranty of 24 months from the [redacted].

[redacted]:

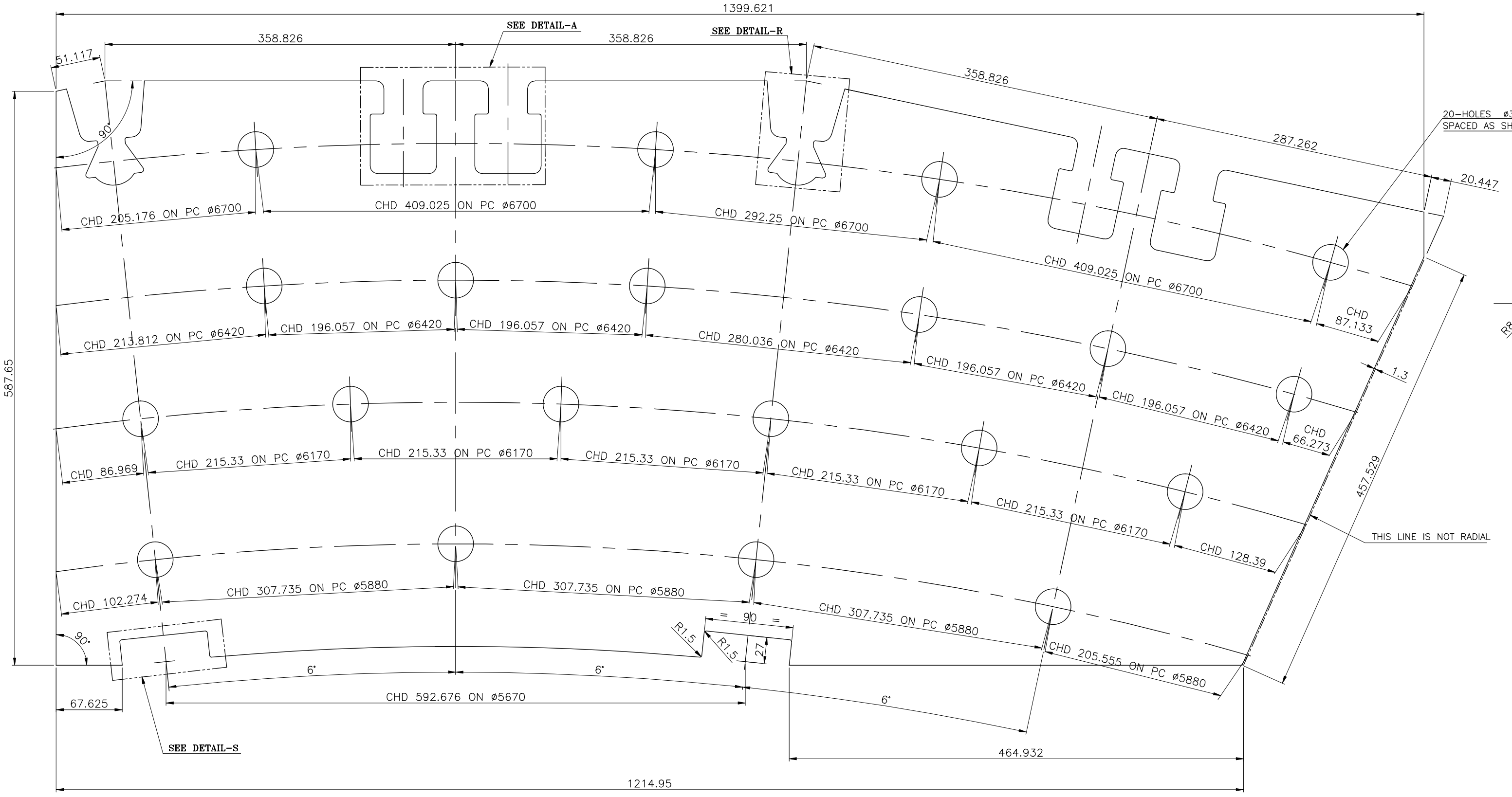
Pointwise confirmation to all [redacted] with suitable supporting catalog is to be enclosed.

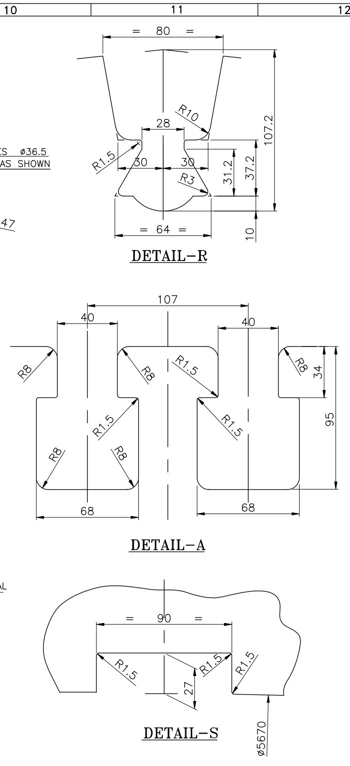
****

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

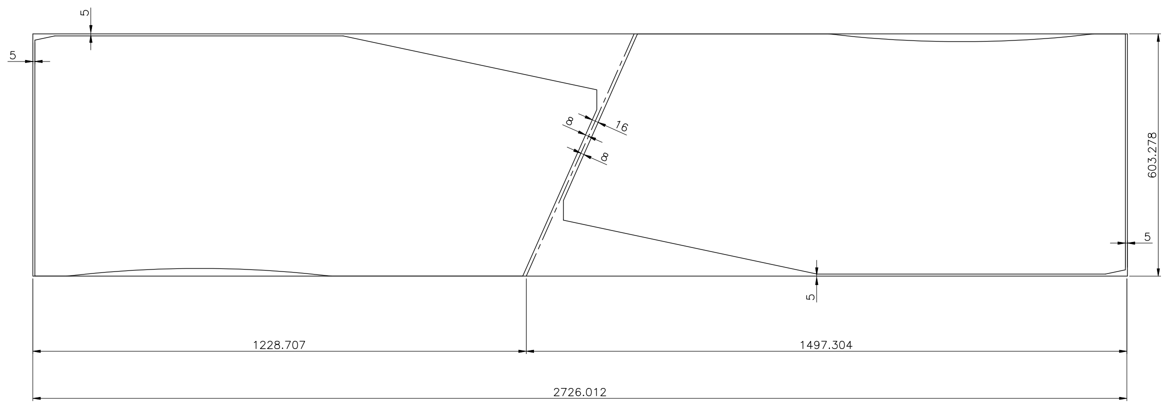
DRG. NO. 1 252 03 31601





TOOL LIST

ITEM NO.	TOOL NO.	DESCRIPTION
		COMPOUND BLANKING DIE.



BLANKING DIAGRAM OF RIM PUNCHING

TECHNICAL REQUIREMENTS :-

1. FOR TOLERANCE LIMITS ON PUNCHING DIMENSIONS REF. –
2. NUMBER OF PUNCHING ARE CALCULATED ON 2.25 MM. NOMINAL THICKNESS OF PUNCHING.
3. 16980 MM STACK HEIGHT OF ITEM 1 CORRESPONDS TO 7245 NOS. OF PUNCHING.
4. ACCEPTABLE BURR HEIGHT :– 40~60 MICRONS.
   TOOL TO BE REGROUND IF BURR HEIGHT INCREASE BEYOND 60 MICRONS.

NOTE TO PRESS SHOP

(A) THE LOOSE STACK HIGHT OF PUNCHINGS SHALL BE SHIPPED TO PLM BY PRM.
(B) PUNCHINGS SHALL BE SHIPPED TO SITE BY MEASURING LOOSE STACK HEIGHT.
(C) THE LOOSE STACK HEIGHT OF PUNCHINGS SHIPPED TO SITE SHALL BE INTIMATED TO HGE BY PLM/PRM.
(D) AREA OF EACH PUNCHING = 6860 CM^2

NOTE FOR TOOL DESIGN

NOMINAL GAP BETWEEN TWO ADJACENT PUNCHINGS ON ASSY. IS 1.3MM.

VAR.OO	REMARKS	VAR NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	MATL. CODE / MATL. SPCN.	UNIT	UNIT WT. / QTY.	GS	ZONE
7245	INCLUDING 45 EXTRA	00	001	RIM PUNCHING 2.25 TK.			HG10066Gr.600	NA / NA	12.11 / NOS		

28 → CARD TYPE-3 · 28 → CARD TYPE-1 · 28 → CARD TYPE-2

ADDITIONAL INFORMATION W.O.–38305 TO 10 P 23152

STATUS OF DRAWING U

DISTRIBUTION OF PRINTS
HGE – 3 PLM – 4 TGM(DO) – 4
PRM – 4 TEX – 1

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: HGS–830/110–30D, SJVN LTD./RAMPUR HEP

BHARAT HEAVY ELECTRICALS LTD. BHOPAL

	NAME	SIGN	DATE
DRN	ANUPAM		
CKD	DKC		
APPD	PC		

NO. OF VAR. 00

DEPT.	UNTOL. DIMS. GR.	SCALE	WEIGHT(K.G.)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEM
HGE, CODE 403	325003001404	1:2.5	12.11	0 252 03 31601	NA	001

TITLE: RIM PUNCHING

DRAWING NO. 1 252 03 31601 — REV. 00

SHT. NO. 01 — NO. OF SHT. 01

FOR INFORMATION AND TENDER PURPOSE ONLY

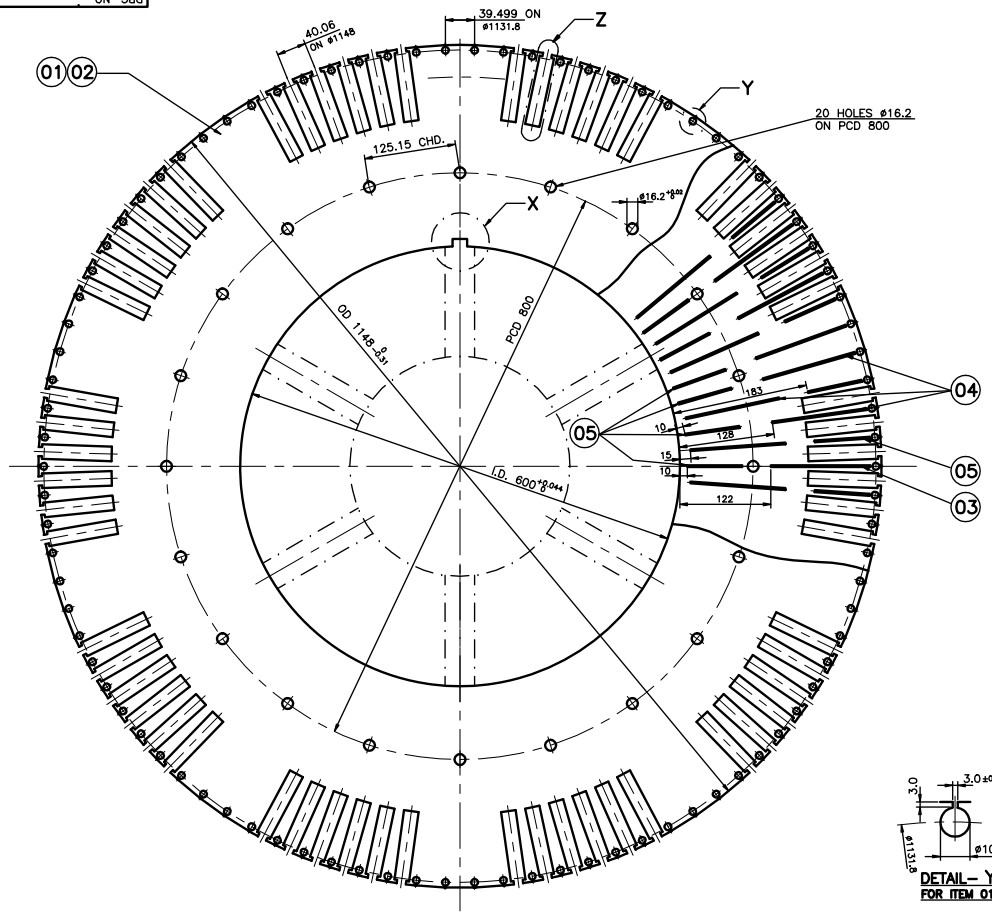
A1 SIZE

CADZONE-G

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm.)

DRG. NO. 14038140124

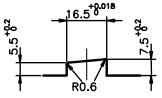


TECHNICAL REQUIREMENTS :–

1. 90 SLOTS NLA 10.2 / 3.0+3.0 FOR DAMPER BAR (10 GROUP OF 9 SLOTS) AS SHOWN IN ROTOR CORE PUNCHING ITEM 01 EQUALLY SPACED ON PERIPHERY.
2. 60 SLOTS NGF 20/12.5x95+4 FOR FIELD COIL (10 GROUP OF 6 SLOTS) AS SHOWN IN ROTOR CORE PUNCHING ITEM 01 ARE SPACED AS 90 SLOTS EQUALLY SPACED ON PERIPHERY.
3. 90 SLOTS 11x13.7 FOR DAMPER BAR (10 GROUP OF 9 SLOTS) AS SHOWN IN END STAMPING ITEM 02 EQUALLY SPACED ON PERIPHERY.
4. 60 SLOTS 22x100 FOR FIELD COIL (10 GROUP OF 6 SLOTS) AS SHOWN IN END STAMPING ITEM 02 ARE SPACED AS 90 SLOTS EQUALLY SPACED ON PERIPHERY.
5. 20 HOLES ø16.2 ON PCD 800 FOR CORE STUD IN ITEM 01 & 02 EQUALLY SPACED ON PERIPHERY.
6. THE ROLLING DIRECTION CONTINUOUSLY CHANGED BY 120° IN CONSECUTIVE PUNCHINGS.
7. SPACERS (ITEMS 02 TO 05) ASSEMBLED TO ITEM 02 BY PROJECTION WELDING.
8. WELDING REFER – PRM/TS/002 & 005.
9. CLAMPING, WELDING & CUTTING OF BOLTS TO BE DONE KEEPING 2mm BOLT LENGTH BEYOND PRESSING PLATE AT NDE.
10. PRESSING FORCE OF CORE – 700 kN.
11. SLOT WIDTH FOR WINDING – $20^{\ 0}_{-0.3}$
12. SPACER PLATE ASSY. PAINT TO AM 54173 (PRIMER ONLY).
13. FOR TOLERANCE ON PUNCHINGS REFER AM54193.

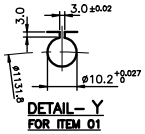
TOOL LIST

ITEM	TOOL	DESCRIPTION
	1517390	O.D. BLANKING TOOL ø1250
	1515124	SHAFT HOLE DIE WITH KEYWAY
	1591498	NOTCHING & TRIMING TOOL FOR DAMPER (MAIN)
	1517266	NOTCHING TOOL FOR DAMPER (WIDER)
	1517152	BOLT HOLE DIE
	1515480	SUPPORT CENTRE PLATE
	1591500	NOTCHING TOOL FOR SLOT (MAIN)
	1515552	NOTCHING TOOL FOR SLOT (WIDER)
	1446377	STACK CHECKING BAR (B/HOLES)
	1432669	STACK CHECKING BAR (20 WIDE SLOT)
	1591038	SLOT CHECKING BAR (20 WIDE SLOT)
	1515403	STACK CHECKING BAR (DAMPER)
	1567992	SLOT BUILDING BAR (DAMPER)
	1507996	LOCATION PLATE FOR PROJ. WELD
	1516751	LOCATOR FOR PROJECTION WELD
	1591504	SLOT BUILDING BAR (B/HOLES)
	1591495	CLAMPING PLATE FOR ROTOR CORE BUILDING FIXTURE 1515023
	1515559	SLOT BUILDING BAR (MAIN)
	1591496	SLOT DRIFT (MAIN)
	1515561	CHECKING GAUGE (MAIN)
	1515406	SLOT BUILDING BAR (DAMPER SLOT)
	1515407	DRIVING BAR (DAMPER SLOT)
	1515410	CHECKING GAUGE (DAMPER SLOT)
	1591866	CORE BUILDING FIXTURE
	1591558	NOTCHING TOOL DAMPER (MAIN)
	1591559	O/D TRIMMING TOOL
	1591026	SLOT CHECKING GAUGE ø10.2
	1611154	DRIVING BAR FOR MAIN SLOT

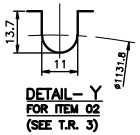


DETAIL– X

COMPOUND TOOL FOR IT. 01 :– 1611121

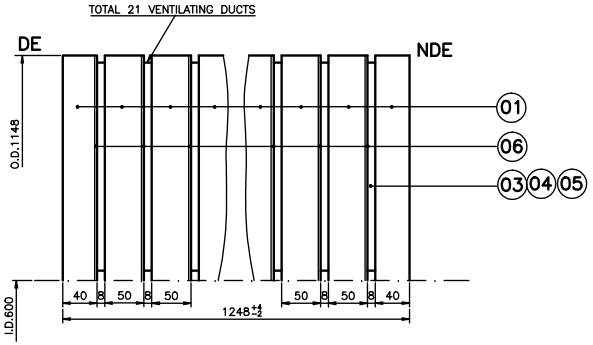


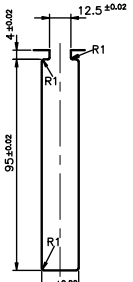
DETAIL– Y FOR ITEM 01



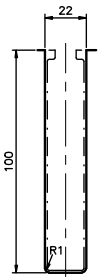
DETAIL– Y FOR ITEM 02 (SEE T.R. 3)

GES NO. 404548582 VAR 00





DETAIL– Z FOR ITEM 01



DETAIL– Z FOR ITEM 02

21	MADE OF ITS. 2 TO 5		06	SPACER PLATE ASSY.				4.8
1890			05	SPACER 75 LG.	34028142035	24		
1680			04	SPACER 130 LG.	34028142035	11		
210			03	SPACER 135 LG.	34028142035	05		
21			02	END STAMPING 0.75TK.UNVARNISHED			AA10115	3.66
1580			01	ROTOR STAMPING 0.65TK. VARNISHED			AA10917	3.18

VAR 59	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	STD.	DRAWING NO.	IT. NO.	MATL. CODE	UNIT WT.	ZONE
	CARD TYPE-3			CARD TYPE-1				CARD TYPE-2		

ADDITIONAL INFORMATION
W.O.:-43016A425-61/62/63
STATUS OF DRAWING

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: 1DQ4344 M/S NTPC VINDHYACHAL STPP

DISTRIBUTION OF PRINTS
AME 01 PRM 04
PLM 03
GTG(EM) 01

BHARAT HEAVY ELECTRICALS LTD. BHOPAL

	NAME	SIGN.	DATE
DRN	LP	–sd–	16.10.04
CHD.	RPG	–sd–	16.10.04
APPD	SB	–sd–	16.10.04

REV.	DATE	ALTERED / CHECKED / APPROVED
02	9.8.05	–sd–
01	6.12.04	–sd–

TOOL NO. 1517266 WAS 1611122.

TOOL NO. 1591866 WAS 1515023. TOOL NO. 1611154 ADDED.

DEPT. AME CODE 404 | GRADE OF UN. TOL. DIM. C/M/F | SCALE NTS | WEIGHT(Kg) 5110 | REF. TO ASSY. DRG. | ITEM NO. | NO. OF ITEMS

TITLE: ROTOR CORE

CARD CODE | DRAWING NO. 14038140124 | REV 02

SHEET NO. 01 NO. OF SHEETS 01

LP/ROTOR/14038140124

INVENTORY NO. | SIGN & DATE | REF. DRG. NO.

FOR INFORMATION AND TENDER PURPOSE ONLY`

SIZE A1