



Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL PURCHASE / MATERIALS MANAGEMENT / MANUFACTURING

An ISO 9001
Company

ENQUIRY	Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com
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	Enquiry Number: 2620700048	Enquiry Date: 28.07.2007	Due date for submission of quotation: 14.09.2007
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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	Travelling Column Type Heavy Duty Radial Drilling Machine as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	3 Nos.	30.07.2008

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 “2620700048”.

Tenders should reach us before 14:00 hours on the due date Tenders will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present	Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED Manager / Capital Purchase / MM / Manufacturing
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PART A.**QUALIFYING CRITERIA FOR THE SUPPLY OF TRAVELING COLUMN
HEAVY DUTY RADIAL ARM DRILLING MACHINES****SECTION – I : COMPANY PROFILE**

The BIDDER has to necessarily provide the details pertaining to each clause in the table given below and wherever necessary additional sheets may be attached (giving clear reference number) to cover the required details.

S.No.	PARTICULARS	VENDOR's RESPONSE
1.0	Number of Years of Experience of the BIDDER / VENDOR in the field of Design, Manufacture & Supply of Heavy Duty Traveling Column type Radial Drilling Machines	
2.0	Details on the Codes/Standards of Machine Design and Manufacture	
3.0	Details on Manufacturing Facilities available with the VENDOR for : a) Building Large Machine Castings b) Heat Treatment Facilities c) Heavy Machining & Grinding d) Machine Assembly & Testing	
4.0	Details of Quality System (with Stages of Internal Inspection) followed for the Machine Building and Testing of Capacity	
5.0	Details of Electrical/Electronic Control Panel Design, Manufacturing and Testing Facilities	

SECTION – II : QUALIFYING CRITERIA

The BIDDER / VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for the Heavy Duty Radial Drilling Machines: [Additional Sheets shall be attached with the OFFER, to provide requisite details]

S.No.	REQUIREMENTS	VENDOR's RESPONSE
6.0	The BIDDER / VENDOR shall have a minimum of TEN Years of Continuous Experience of in the Field of Design, Manufacture & Supply of Heavy Duty Radial Arm Drilling Machines	
7.0	Profile of the Company bringing-out the years of Experience and Capability of the BIDDER in the field of design, manufacture and supply of Heavy Duty Drilling Machines .	

S.No.	REQUIREMENTS	VENDOR's RESPONSE
8.0	The BIDDER / VENDOR might have supplied atleast two numbers of Heavy Duty Radial Arm Drilling Machines with Spindle Power more than 10 kW and Drilling Head Traverse over 1200 mm on the Arm.	
9.0	Performance Certificate in the enclosed FORMAT for a period, not less than one year, from CUSTOMERS and Reference List of Customers with full contact details of CONTACT PERSON, who are the End Users of Heavy Duty Radial Arm Drilling Machines supplied as per Clause No.8.0	
10.0	BHEL reserves the right to verify the information provided by vendor. In case, it is found to be false/ incorrect, the offer shall get rejected.	
11.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centres in India, to be furnished .	

SECTION – III : BID / OFFER FORMATS

The BIDDER / VENDOR has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser :

S.No.	REQUIREMENTS	VENDOR's COMPLIANCE
12.0	The BIDDER shall submit the offer in TWO PARTS - Technical [with PART A & PART B] & Commercial and Price Bid.	
13.0	The OFFER shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each Clause. A just '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.	
14.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue (if applicable)	
15.0	The Commercial 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, auxiliary parts, spares, consumables, etc. with the main and basic equipment, to meet the technical specification requirements.	
16.0	Earlier performance/field experience (including service support) if any, with BHEL for the VENDOR's Equipment, will be a reckoning factor for the technical qualification of the OFFER.	

PERFORMANCE CERTIFICATE – [SAMPLE FORMAT]

(On Customer's Letter Head)

1. Supplier of the Equipment/Machine :

2. Make & Model of the Equipment :

3. Month & Year of Commissioning :

4. Application for which Machine is used :

5.
 - a. Equipment Serial Number :
 - b. Spindle Motor Power in Horse Power/kW :
 - c. Drilling Capacity in Steel in millimeters :
 - d. Drilling Head Traverse in millimeters :
 - e. Vertical Stroke of Radial Arm in millimeters :
 - f. Machine Column Traverse in X-axis in meters :

6. Performance of the Machine : Best in the market /
(with reasons for recommendation) Satisfactory /
Good /
Average /
Not Satisfactory

7. Any other Remarks :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

PART B**TECHNICAL SPECIFICATIONS FOR HEAVY DUTY TRAVELLING COLUMN
RADIAL ARM DRILLING MACHINE****PURPOSE:**

These heavy-duty radial drilling machines are meant for drilling and boring of holes in pipes and cylindrical shells (viz., Boiler Drum and Header Pipes) coming in Utility and Industrial Boilers. These machines will be operated on three-shift basis. The enquiry is for six machines in total required for three workcentres and in each work-centre two machines will be mounted on the same slide-way built-up by adding suitable number of machine beds to form a machine traverse of 21,000 mm.

These machines shall be capable of drilling in curved shells of solid steel with thickness up to 300 mm. For Industrial Boiler Drum, nearly 1000 holes of diameter 51.8 mm (per work-piece) are to be drilled on a portion of circumference only, in multiple rows with reaming finish as per standards. The drilling machines will also be used for machining of free ends (oxy-acetylene flame cut ends) of nozzles/stubs welded to shells or pipes to form weld edge after the hydraulic testing.

In all the above cases, the work-pieces with job rotators or 'V' Blocks or Jigs or Platform will be placed on Fitter's Bar (with slots for clamping) running throughout the length of the work-centre (21,000 mm).

JOB DETAILS :**A. Material :**

- a. Steel with tensile strength of 60 kg / mm²
(SA106Gr.B/C, SA299, SA515/516Gr.60/70asper ASTM Standards)
- b. Cast- Iron with tensile strength of 25 kg / mm².
- c. Alloy Steel and Stainless Steel (martensitic) for Header pipes only
(SA 335 Gr.P11/P12/P22/P91 as per ASTM Standards and
X-20 CrMoV 121 as per DIN Standards)

B. Dimensions :

No.	PART DESCRIPTION	LENGTH in mtrs.	JOB DIAMETER in mm	WALL THICKNESS in mm	WEIGHT in TONS
1	Drum Shells	6.0 to 12.30	914 to 2200	40 to 300	20 to 100
2	Drum End-Cover	-	914 to 2200	60 to 300	1.5 to 10
3	Header Pipes	1.0 to 24 .0	219 to 914	20 to 140	1.0 to 10

TYPE OF DRILLS USED : Standard 118 ° lip angle HSS drills without web thinning.
Drills with replaceable carbide / HSS inserts.

EDGE PREPARATION : EP of drilled holes (Asymmetrical cutting by two cutting tool bits mounted in the same tool holder, taking cut simultaneously)

DESCRIPTION OF JOBS :

Annexure – 1 to 5 give Cross-sectional view of typical drum shell with stubs and nozzles Welded to drum shell . And typical drilling of holes in hemispherical end-covers.

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
1.1	MACHINE CONFIGURATION: The machine shell be consist of a vertical column mounted on the base plate. The horizontal arm moves up and down the column and can be locked at any position. The drilling Head moves horizontally on the horizontal arm and can be locked at any position. The spindle is housed in the drilling head and can be moved up and down. In each work center two machines will be mounted on the same slide-way built-up by adding suitable number of machine beds to form a machine traverse of 21,000 mm for drilling as per requirement of the job	Vendor to confirm	
1.2.0	DRILLING HEAD		
1.2.1	Drilling capacity in steel @ 0.6 mm/rev feed at 45 RPM.	100 mm	
1.2.2	Threading capacity in steel	M 100 x Various std pitch.	
1.2.3	Boring capacity in solid steel	300 mm	
1.2.4	Drilling capacity in solid cast iron	125 mm	
1.2.5	Taping capacity in solid cast iron	M120 x various std pitch.	
1.2.6	Power of spindle motor	Not less than 15.0 kW	
1.2.7	Taper in spindle	MT 6	
1.2.8	Spindle stroke	Not less than 475 mm	
1.2.9	Spindle diameter in front bearing	110 mm h6	
1.2.10	Number of spindle speeds	Not less than 14	
1.2.11	Spindle speed range	10-1000 rpm	
1.2.12	No of feeds	Not less than 12	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR'S OFFER
1.2.13	Spindle feed range	0.056 to 3.54 mm/rev	
1.2.14	Auto depth control mechanism for spindle stroke.	Vendor to specify	
1.2.15	Quill diameter	Vendor to specify	
1.2.16	Maximum drilling thrust	Vendor to specify	
1.2.17	Maximum torque on spindle	Vendor to specify	
1.2.18	Mode of pre selection of feed and speed	Vendor to conform	
1.2.19	Powered Travel of drilling unit on arm	Vendor to conform	
1.2.20	Power for other systems like elevating motor, locking motor, coolant pump, lubrication system etc. to be indicated separately.	Supplier to specify	
1.3.0	RADIAL ARM		
1.3.1	Maximum distance between spindle nose to base of the machine	3000 mm	
1.3.2	Minimum distance between Spindle nose to base of the machine	Not more than 950 mm	
1.3.3	Maximum distance from the axis of the spindle to the guide ways on the Machine Column	4000 mm	
1.3.4	Minimum distance from the axis of the spindle to the guide ways of column	Not more than 550 mm	
1.3.5	Drill head traverse along the Radial Arm	Around 3400 mm	
1.3.6	Vertical Travel of arm on the column	Minimum 1600 mm	
1.3.7	Swing of the arm around the column	Vendor to specify	
1.3.8	Powered swing of Arm on the column	Vendor to specify	
1.3.9	Arm dimensions	Vendor to specify	
1.3.10	Centralised and independent clamping mechanism of arm on column. Vendor to submit details	Vendor to specify	
1.3.11	Basic column travel in base per work center (including basic travel length of 2 machines per work center).	21(Twenty one meters)	
1.3.12	Overall length of base for the above traverse in Pt.1.3.11	Supplier to specify	
1.3.13	Total traverse when the two machines are taken to the extreme end of the slide ways.	21 M (between the centerline of two columns).	
1.3.14	Minimum distance between the axis of spindle of two machines, when they are brought together.	Supplier to specify	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR'S OFFER
1.4.0	MACHINE COLUMN		
1.4.1	Column dimensions	Vendor to specify	
1.5.0	MACHINE GUIDE WAYS		
1.5.1	Width of Arm guide ways	Vendor to specify	
1.5.2	Width of column guide ways	Vendor to specify	
1.5.3	Hardness of guide ways	Vendor to specify	
1.6.0	BED/FLOOR PLATE		
1.6.1	Dimensions of the base plate	Vendor to specify	
1.6.2	Height of the base plate	Vendor to specify	
1.6.3	Size of T-slots	Vendor to specify	
1.6.4	T-slots pitch (as per DIN standard)	Vendor to specify	
1.6.5	Weight carrying capacity of the base plate	Vendor to specify	
1.7.0	CONSTRUCTION:		
1.7.1	Vendor to furnish details of material, hardness & constructional details, including explanatory drawings, of various components/assemblies like Column, bed, Arm Drilling unit, spindle etc.of the machine.	Vendor to furnish	
1.7.2	Video images on CD including hard copy explaining the technical features / Literature with photographs, drawings explaining the technical features should be enclosed with the offer	Vendor to furnish	
17.3	Make and rating of motors for a) Spindle b) Arm Elevation c) Powered Drill Head Traverse on arm and d) Coolant Pump should be furnished	Vendor to furnish	
1.8.0	OPERATION AND CONTROL SYSTEM:		
1.8.1	OPERATOR'S PANEL: Operator's panel mounted on the drill head shall be provided. All switches on the Operator's panel should be within reach of operator for convenient, efficient & safe operation. All indications should also be conveniently placed accordingly. No separate switch box is needed.	Vendor to confirm	
1.9.0	MACHINE LIGHTS:		
1.9.1	Machine Lights to be provided as built in with Headstock for sufficient illumination of complete working area for clear visibility.	Vendor to confirm	
1.9.2	A magnetic base 24-volt portable spotlight with sufficiently long cable should also be provided.	Vendor to confirm	
1.9.3	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to confirm	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
1.10.0	ELECTRICAL SYSTEM:		
1.10.1	415V + 10% / -10%, 50HZ +/-1.5 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.	Vendor to confirm	
1.10.2	All electrical equipment shall be Tropicalized	Vendor to confirm	
1.10.3	All electrical control cabinets & panels should be dust and vermin proof	Vendor to confirm	
1.10.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to confirm	
1.10.5	All electrical panels 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	
1.10.6	Motors shall be from M/s Siemens / ABB or other reputed make conforming to IEC and acceptable to BHEL .	Vendor to confirm	
1.10.7	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.		
1.10.8	Vendor should ensure the proper earthing for the machine and its accessories.	Vendor to confirm	
1.11.0	SAFETY ARRANGEMENTS: Following safety features in addition to other standard safety features should be provided on the machine:	Vendor to confirm	
1.11.1	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, work piece and the operator due to the malfunctioning or mistakes.	Vendor to confirm	
1.11.2	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to confirm	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
1.11.3	All the pipes, cables etc. on the machine should be well supported and protected.	Vendor to confirm	
1.11.4	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor to confirm	
1.11.5	Emergency Switches at suitable locations as per International norms are to be provided.	Vendor to confirm	
1.11.6	Oil & water pipe lines should not run with electrical cable in the same tray / trench.	Vendor to confirm	
1.11.7	Self engaging lever and hand wheel protruding out shall avoid hitting against the head of the Operator, during inspection of drilled holes.	Vendor to confirm	
1.12.0	ENVIRONMENTAL PERFORMANCE OF THE MACHINE: The Machine shall conform to following factors related to environment	Vendor to confirm	
1.12.1	Maximum noise level shall be 85 dB (A) at normal load condition, 1 M away from the machine with correction factor for back ground noise, if necessary. 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	
1.12.2	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to confirm	
1.12.3	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor to confirm	
2.0	TOOLINGS:		
2.1	Reduction sleeves MT6-5, 6-4, 4-3 & 4-2, both long & short series.	Vendor to confirm	
2.2	Tapping attachments of capacity M48x5 to M100x4 with full set of collets. (Vendor should furnish list and details)	Vendor to confirm	
2.3	Utility tools like drifts and cotter pins of all sizes (2 sets)	Vendor to confirm	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
3.0	LEVELING & ANCHORING SYSTEM		
3.1	Complete anchoring system including foundation bolts, anchoring materials, fixtures, leveling shoes etc shall be supplied for the Machine etc.	Vendor to confirm	
4.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE		
4.1	The vendor shall bring special tools and equipment required for erection of the machine. 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 confirm	
4.2	Test mandrel for checking spindle run-out & alignment should be supplied	Vendor to confirm	
5.0	SPARES:		
5.1	Itemised breakup of mechanical, hydraulic, electrical used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: (Unit Price of each item of spare should be offered)	Vendor to furnish	
5.2	Mechanical & Hydraulic Spares: All types of pumps, All types of Valves, All types of pressure switches / transducers, All types of filters, All types of seals, O rings, Hydraulic Hoses etc.	Vendor to furnish	
5.3	Electrical: All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch.	Vendor to furnish	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
5.4	All types of spares for total machine and accessories should be available for at least ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the 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 furnish	
5.5	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 furnish	
6.0	ACCESSORIES		
6.1	Cast iron Box Table with T-Slots (3 Nos)- in mm	1000L x 700B x 800H	
6.2	Tilting Table (Range up to 70 deg-1 no)-in mm	750L x 600B x 550H	
6.3	Centralised Automatic Lubrication system with metal cover.	Supplier to specify	
6.4	Power locking of sleeve on column	Supplier to specify	
6.5	Safety interlock with out put of feed mechanism to prevent overloading.	Supplier to specify	
6.6	Limits shall be provided at extreme end of the base and in between two machines to prevent over travel of the machine and collision of the machine respectively.	Supplier to specify	
7.0	OPTIONAL		
7.1	Saddle positioning clamping system on the bed during drilling & interlock to release during column movement- Hydraulic/Electro hydraulic.	Supplier to specify	
7.2	Provision of telescopic cover for guide-ways on the assumption that two machines will be located on a common bed length of 21M and to operate both the machines to min and max distance from each other.	Supplier to specify	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
7.3	Pressure coolant at 75 LPM at min 5 Bar for using throw away type drills inserts – BHEL will provide special attachment for coolant discharge to drills.	Supplier to specify	
7.4	FITTER'S BAR (with slots for clamping) in two rows for the entire length of machine slide ways (to cover an effective width of 1000 mm) for each work center.	Supplier to specify	
8.0	IMPORTANT NOTES :		
8.1	Machine configuration shall be such that drilling head; arm, column and base shall be sturdy enough to withstand all types of reactionary forces developed while drilling (radial).	Supplier to specify	
8.2	Both longitudinal and cross alignments of machine bed guide ways shall be accurate enough to ensure smooth travel of machine on either side from the mid point of the bases.	Supplier to specify	
8.3	Selecting guide way profile and spacing of guide ways shall ensure jerk free travel and provide sufficient seating area for column base for vibration-free drilling.	Supplier to specify	
8.4	Column travel – if it is rack and pinion type, to provide inverted racks in order to protect racks from drill chips.	Supplier to specify	
8.5	Column drive gear shall be sturdy with proper mounting with the base without over-hanging. Standard gearboxes of make like Radicon/Elecon/Allryod/SEW preferred.	Supplier to specify	
8.6	For arm up and down travel, bellows and bottom support to be provided if it is screw rod / nut arrangement.	Supplier to specify	
8.7	For drill head movement in the arm, hardened guide-ways with linear motion bearings preferred.	Supplier to specify	
8.8	For the entire length of each work-centre, festoon arrangement for input power cables shall be provided for easy drag and to avoid entangling with any other part of the system.	Supplier to specify	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
8.9	Locking mechanism for provisions referred in S.Nos6 & 7 are to be spelt out with details	Supplier to specify	
8.10	Headstock and head travel hydraulic is preferable.	Supplier to confirm	
8.11	Dial collar on headstock having good quality of chromium plating.	Supplier to confirm	
8.12	All locking mechanisms having trouble free one.	Supplier to confirm	
8.13	Up & down and Travel movement two parallel control required. One at headstock and other at control panel.	Supplier to confirm	
8.14	Flexible metal hose for coolant is preferable at headstock.	Supplier to specify	
8.15	Provide high quality of coolant hose in the saddle area to avoid damage.	Supplier to specify	
8.16	Some good system to be introduced to avoid oil leakage from spindle during higher strokes.		
9.0 GENERAL POINTS:			
9.1	The offer shall clearly indicate the list of standard accessories that will be supplied along with the machine	Supplier to confirm and enlist	
9.2	Other special accessories shall be quoted separately as optional items	Supplier to confirm and enlist	
9.3	All controls and other operating systems shall be located in a centralized convenient place for easy operation.	Supplier to confirm and enlist	
9.4	All hydraulic elements shall be of Vickers/Rexroth make	Supplier to confirm and enlist	
9.5	All motors shall be from M/s Siemens/NGEF/KEC/ ABB. If outside INDIA, make shall confirm to IEC standard.	Supplier to confirm and enlist	
9.6	All electrical devices like contactors, relays and limit switches, push buttons etc. shall be from Siemens / L&T/Alstom/Cuttler Hammer / Telemecanique.	Supplier to confirm and enlist	
9.7	All components/devices/terminals are to be incorporated with ferrules. (Numbered)	Supplier to confirm	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
10.0	DOCUMENTATION:		
10.1	Five sets of following documents (Hard copies) in English language should be supplied along with the machine	Vendor to confirm	
10.2	Detailed Operation and Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also	Vendor to confirm	
10.3	Catalogues, O&M Manuals and drawings of all bought out items, bearings wherever applicable.	Vendor to confirm	
10.4	Electronic and electrical interconnecting drawings (i.e. Between machine, control panel and drives). Hard copy Original: 3 nos	Vendor to confirm	
10.5	Specification with drawings of clutch plates and break plates.	Vendor to confirm	
10.6	Hydraulic and Electrical circuits with BOM	Vendor to confirm	
10.7	Detailed specification of all rubber items and hydraulic/lube fittings	Vendor to confirm	
10.8	The vendor shall submit complete Master List of parts used in the machine.	Vendor to confirm	
10.9	One additional set of all the above documentation on CD ROM, wherever possible.	Vendor to confirm	
11.0	FOUNDATION:		
11.1	BHEL shall construct complete foundation for the machine. Vendor shall furnish the foundation details.	Vendor to confirm	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
12.0	ERECTION & COMMISSIONING		
12.1	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control system & all types of other supplied equipment, drilling / tapping of test pieces etc. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL. Vendor should inform details of these requirements in advance.	Vendor to confirm	
12.2	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, as mentioned at clause 16 (Machine Acceptance) shall form part of the commissioning activity.	Vendor to confirm	
12.3	Test mandrel for checking run-out/taper & alignment should be supplied	Vendor to confirm	
12.4	Tools, Tackles, Test Mandrels, instruments and other necessary equipment including Laser equipment required to carry out all above activities should be brought by the supplier.	Vendor to confirm	
2.5	The supplier on returnable basis shall bring commissioning spares, required for commissioning of the machine within stipulated time.	Vendor to confirm	
12.6	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colors of paint used.	Vendor to confirm	
12.7	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to confirm	
12.8	Charges, duration, terms & conditions for E&C should be furnished in detail	Vendor to confirm	

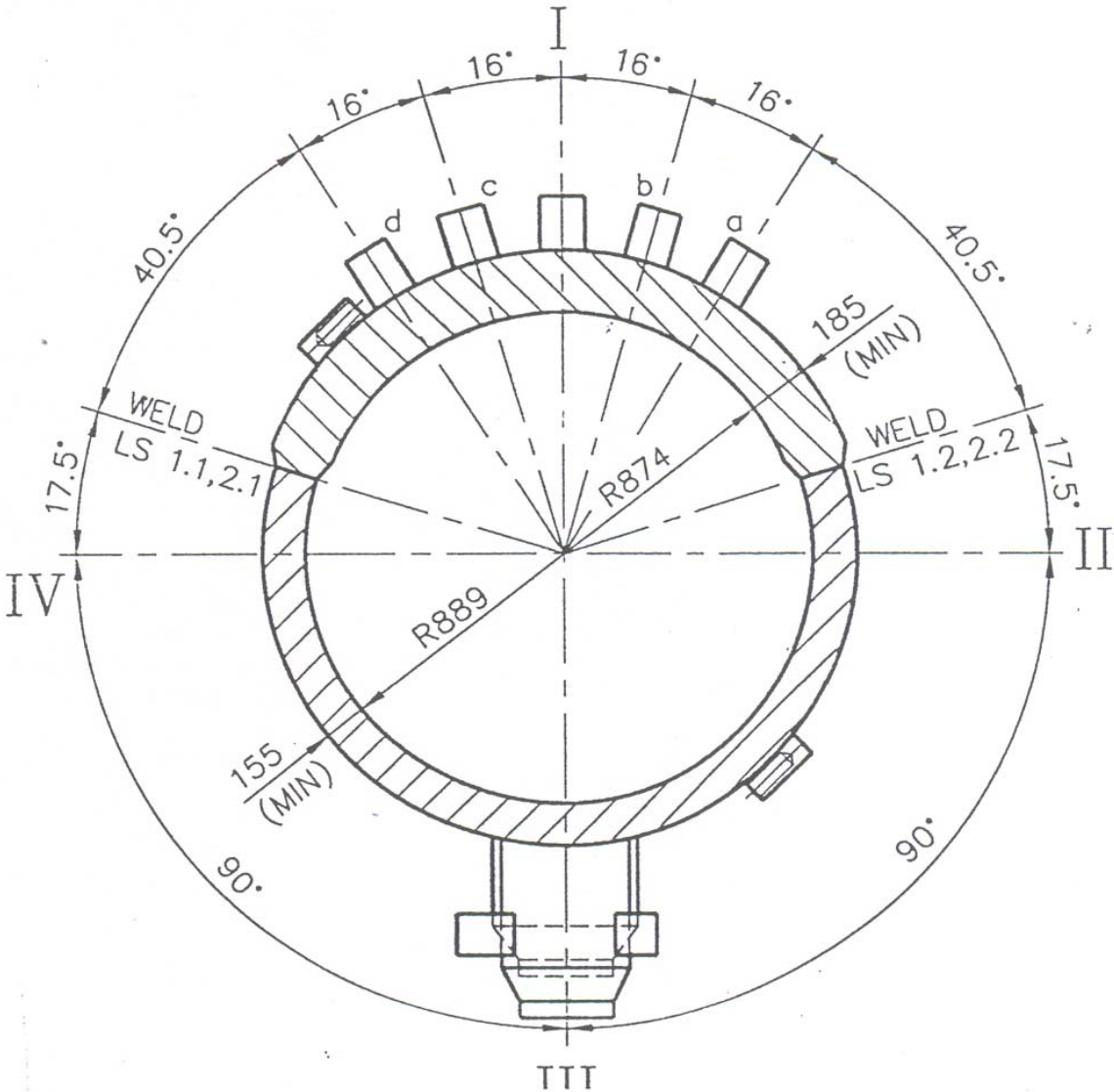
S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
13.0	ACCURACY TESTS		
13.1	GEOMETRICAL ACCURACIES		
13.1.1	Geometrical Accuracy Tests shall be in accordance with IS: 2199, ISO 2423 standard or equivalent applicable standard. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall also be submitted with the offer.	Vendor to confirm	
13.1.2	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance tests at Suppliers works and during Erection & Commissioning at BHEL Works.	Vendor to confirm	
13.2	FINISH REQUIREMENTS		
13.2.1	Reamed holes with H7 tolerance and 1.6 microns surface finish with reaming shall be demonstrated at the maximum drilling radius	Vendor to confirm	
14.0	AMBIENT CONDITIONS & THERMAL STABILITY		
14.1	Total machine and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies. Power Supply: Voltage: 415 V - 10%, +10% Frequency: 50 Hz \pm 1.5 Hz No. Of phases = 3 (No neutral) Ambient Conditions: Temperature = 5 to 50 degree Celsius Relative Humidity = 95% max.	Vendor to confirm	
14.2	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 to confirm	
14.3	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and vendor should ensure trouble free operation of the machine.	Vendor to confirm	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
14.4	The machine, including attachments and accessories, should be suitable for 24 hrs. Continuous operation to its full capacity for 24 hour a day and 7 days a week throughout. Vendor to ensure and confirm the same.	Vendor to confirm	
15.0	PROVEOUT OF MACHINE CAPACITY		
15.1	The capacity and capability of the machine is to be demonstrated on a test piece on which drilling and tapping shall be done. Tooling shall be supplied by BHEL.	Vendor to note	
16.0	MACHINE INSPECTION and ACCEPTANCE: (Tests/Activities to be Performed by Vendor)	Should be accepted & confirmed by Vendor	
16.1	Tests/Activities should be carried out at Supplier's Works on the machine before dispatch:	Vendor to confirm	
16.1.1	Geometrical Accuracy Tests as per test chart.	Vendor to confirm	
16.1.2	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.	Vendor to confirm	
16.2	Test to be carried out at BHEL works while commissioning the machine:	Vendor to confirm	
16.2.1	Geometrical Accuracy Tests as per test chart.	Vendor to confirm	
16.2.2	Full load test to demonstrate the maximum power & drilling capacity of the machine.	Vendor to confirm	
16.2.3	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.	Vendor to confirm	
16.2.4	Training of BHEL machine operators in operation and maintenance of complete machine & accessories etc by the supplier's experts / engineers during their stay at BHEL works	Vendor to confirm	

S.No.	PARTICULARS	SPECIFICATIONS	VENDOR's OFFER
17.0	PACKING		
17.1	Sea worthy & rigid packing for all items of complete machine, all Accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes	Vendor to confirm	
18.0	GUARANTEE		
18.1	12 months from the date of acceptance of the machine.	Vendor to confirm	
19.0	GENERAL: The vendor should submit the following information:		
19.1	Machine Model	Vendor to specify	
19.2	Total connected load (KVA):	Vendor to specify	
19.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to specify	
19.4	Painting of Machine/ Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to specify	
19.5	Total weight of the machine	Vendor to specify	
19.6	Weight of heaviest part of machine	Vendor to specify	
19.7	Weight of the heaviest assembly/ subassembly of the Machine	Vendor to specify	
19.8	Dimensions of largest part/ subassembly/ assembly of the machine	Vendor to specify	
19.9	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 specify	
19.10	Detailed catalogues, sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Vendor to furnish	
19.11	Hydraulic, Pneumatic & oil piping should be preferably metallic except places where flexible piping is essential. All the pipes required for the same shall be included in the standard scope of the machine.	Vendor to confirm	

ANNEXURE - I

**CROSS SECTIONAL OF DRUM SHELL
DRILLING POSITIONS**

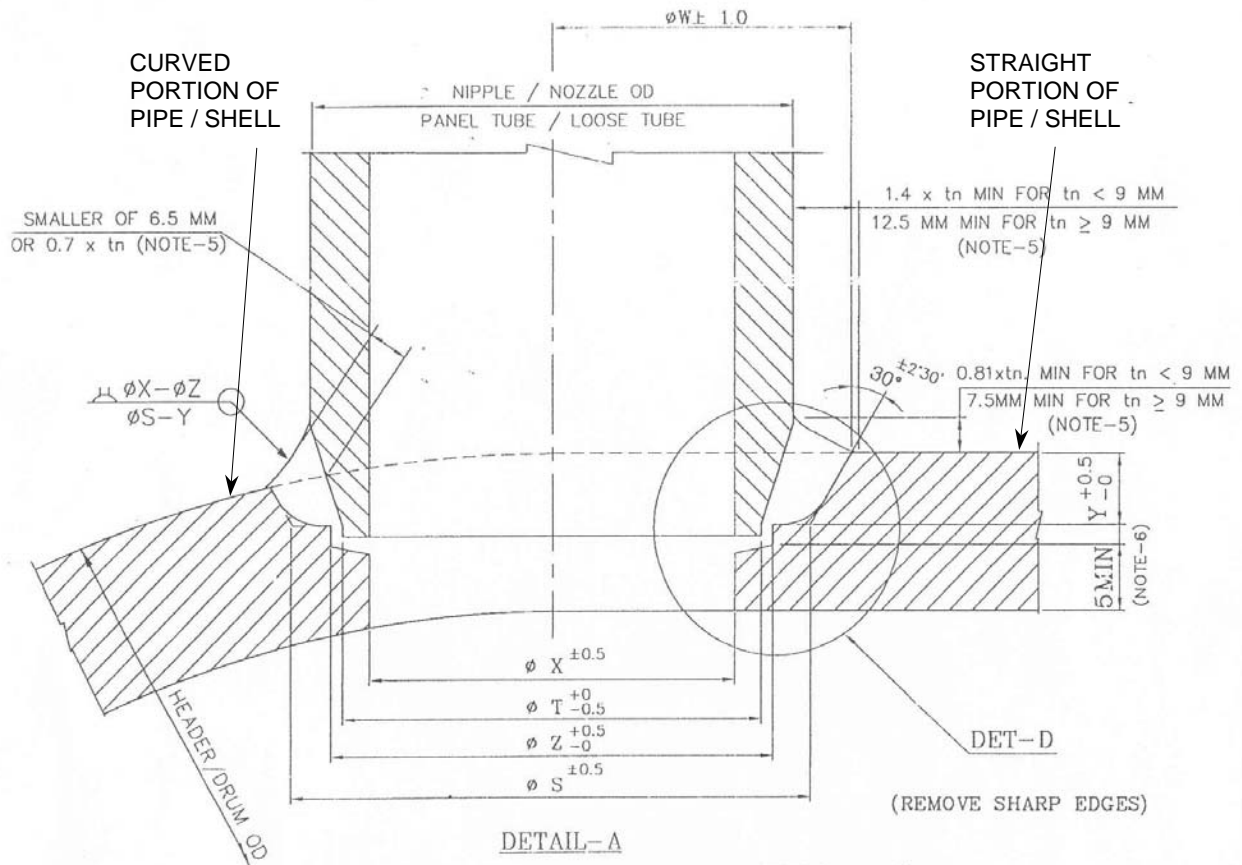


All dimensions are in 'mm'

**CABS - 2 - 28 / 36 - 01
BHEL, Tiruchirappalli**

ANNEXURE - 2

TYPICAL DRILLING & EDGE PREPARATION STYLE

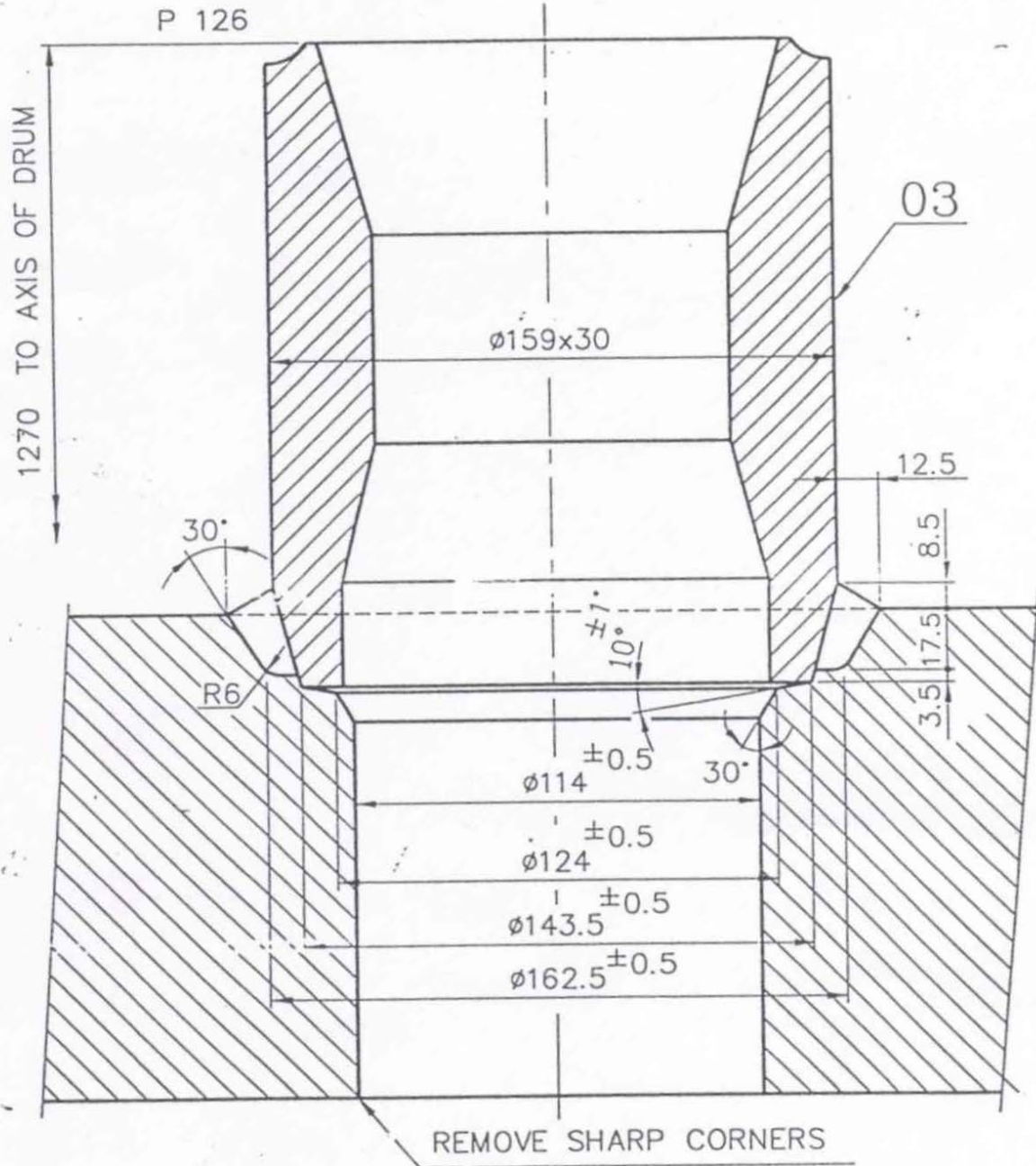


All dimensions are in 'mm'

CABS - 2 - 28 / 36 - 02
BHEL, Tiruchirappalli

ANNEXURE - 4

TYPICAL DRILLING & EDGE PREPARATION STYLE

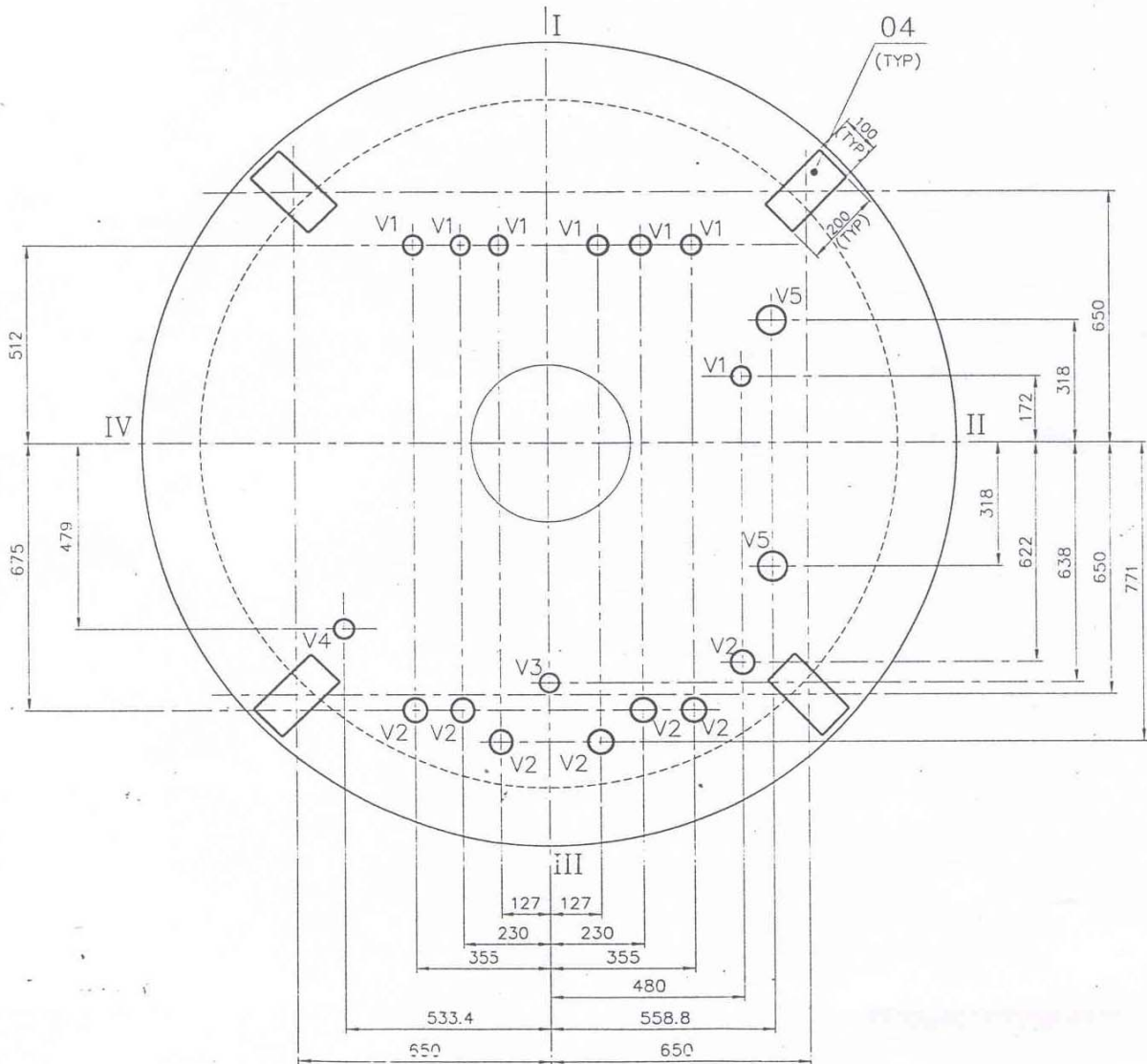


All dimensions are in 'mm'

CABS - 2 - 28 / 36 - 04
BHEL, Tiruchirappalli

ANNEXURE - 5

**POSITION OF DRILL HOLES ON HEMISPHERICAL DISHED-END
(PLAN VIEW)**



All dimensions are in 'mm'

**CABS - 2 - 28 / 36 - 05
BHEL, Tiruchirappalli**