



## Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

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>2620800021</b>	<b>15.05.2008</b>	<b>16.06.2008</b>
You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

Item	Description	Quantity	Delivery (Item required at BHEL on)
10	CNC Horizontal Boring Machine – Spindle Dia 150 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> )	2 Nos.	31.07.2009

**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 “2620800021”.**

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 Equipment / MM

**PART A**  
**CNC HORIZONTAL BORING MACHINE – SPINDLE Ø 150**

**SECTION – I : QUALIFYING CRITERIA**

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer for the CNC HORIZONTAL BORING MACHINE – SPINDLE Ø 150

S. No.	REQUIREMENTS	VENDOR's RESPONSE
1	<p>Only those vendors (OEMs), who have supplied and commissioned at least <b>ONE CNC HORIZONTAL BORING MACHINE (Spindle size 150 mm or higher with Spindle travel 700 mm or higher)</b> in the past ten years (from the date of opening of Tender) and such machine is presently working satisfactorily for more than one year after commissioning (from the date of opening of Tender) should quote.</p> <p>However, if such machine had already been supplied to BHEL, then that machine should be presently working satisfactorily for more than six months after its commissioning and acceptance (from the date of opening of Tender).</p>	
<b>The vendor should submit following information where similar machine has been supplied for qualification of their offer.</b>		
1.1	Name and postal address of the customer or company where similar machine is installed.	
1.2	Name and designation of the contact person of the customer.	
1.3	Phone, FAX no and email address of the contact person of the customer.	
1.4	Month and Year of commissioning of the machine.	
1.5	Application for which the machine is supplied	
1.6	Performance certificate from the customer regarding satisfactory performance of machine supplied to them.	
2.0	BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.	

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**SECTION – I I**

The BIDDER / VENDOR is requested to provide the following information:

<b>S. No.</b>	<b>REQUIREMENTS</b>	<b>VENDOR's RESPONSE</b>
3.0	The BIDDER/VENDOR to furnish Reference List of Customers, with full address, details of contact person, where CNC HORIZONTAL BORING MACHINES have been supplied in the past.	
4.0	Details of CNC HORIZONTAL BORING MACHINES supplied to other BHEL units, if any. (Year of commissioning, Spindle size of machine, Spindle motor power)	
5.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centers in South India.	
6.0	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

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**SECTION – III**

The BIDDER to note:

<b>S. No.</b>	<b>PARTICULARS</b>	<b>VENDOR'S RESPONSE</b>
7.0	The BIDDER / VENDOR shall submit the offer in TWO PARTS. 1. Technical Offer [with PART A & PART B] 2. Commercial and Price Bid.	
8.0	The Technical Offer shall contain a comparative statement of Technical <b>Specifications demanded by BHEL</b> and <b>Offer Details submitted by the Bidder</b> , against each clause. A just 'CONFIRMED' or 'COMPLIED' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.	
9.0	The Technical Offer shall be supported by product Catalogues & Data Sheets and also technical details of Bought-Out-Items with copies of Product Catalogue to the extent possible.	
10.0	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.	
11.0	For obtaining the performance certificate from the customer, a suggestive format is provided in <b>SECTION – IV</b>	

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**SECTION – IV**

The performance certificate should be produced **on Customer's Letter Head.**

**PERFORMANCE CERTIFICATE**

1. Supplier of the machine		
2. Make & Model of the M/C		
3. Month & Year of Commissioning		
4. Application for which M/C is used		
5	a) Spindle Size b) Spindle travel c) Spindle Power d) Table Size e) WT. Carrying Capacity f) CNC System	
6. Performance of the Machine (Strike off whichever is not applicable)		Best in the market / Satisfactory / Good / Average / Not Satisfactory
7. Any Other remarks		
Date: _____ Signature & Seal of the Authority Issuing the Performance Certificate		

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**PART- B****TECHNICAL SPECIFICATION FOR CNC HORIZONTAL BORING MACHINE- Dia 150 mm**

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details																														
1.0	<p><b>PURPOSE:</b> This machine is intended for machining of castings and forgings meant for manufacturing valves.</p> <p>The various operations to be carried out are:</p> <p>    Facing, OD Turning, Boring, Milling, Drilling &amp; Tapping, and Thread cutting (Internal and External)</p> <p>NOTE: During operations of Facing, OD Turning&amp; Boring, the machine will be subjected to intermittent load as machining will be carried out on SS welded or Stellite hard faced surfaces. These surfaces will have hardness in the range of 425 BHN.</p>																															
1.1	<p><b>WORKPIECE MATERIAL SPECIFICATION:</b></p> <p>    The work piece material is either Steel Casting or Steel Forging.</p> <table><tr><th>Material</th><th>Description</th><th>ASTM Specification</th><th>Hardness</th></tr><tr><td rowspan="6">Steel Casting</td><td rowspan="2">Carbon Steel</td><td>A216 WCB, WCC</td><td>185 BHN</td></tr><tr><td>A352 LCB, LCC</td><td>225 BHN</td></tr><tr><td>Alloy Steel</td><td>A 217 WC5, WC6, WC9, C12A</td><td>210 BHN</td></tr><tr><td>Stainless Steel</td><td>A351 CF3M, CF8, CF8C and CF8M</td><td>230 BHN</td></tr><tr><td rowspan="2">Alloy Steel</td><td>SA 182 F22 Class 3</td><td>210 BHN</td></tr><tr><td>SA 182 F91</td><td>225 BHN</td></tr><tr><td rowspan="3">Steel Forging</td><td>Carbon Steel</td><td>SA 105</td><td>185 BHN</td></tr><tr><td rowspan="2">Alloy Steel</td><td>SA 182 F22 Class 3</td><td>210 BHN</td></tr><tr><td>SA 182 F91</td><td>225 BHN</td></tr></table>	Material	Description	ASTM Specification	Hardness	Steel Casting	Carbon Steel	A216 WCB, WCC	185 BHN	A352 LCB, LCC	225 BHN	Alloy Steel	A 217 WC5, WC6, WC9, C12A	210 BHN	Stainless Steel	A351 CF3M, CF8, CF8C and CF8M	230 BHN	Alloy Steel	SA 182 F22 Class 3	210 BHN	SA 182 F91	225 BHN	Steel Forging	Carbon Steel	SA 105	185 BHN	Alloy Steel	SA 182 F22 Class 3	210 BHN	SA 182 F91	225 BHN	
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.0	MACHINE DETAILS:		
2.1	CONSTRUCTION:		
2.1.1	Vendor to furnish constructional details of the machine including explanatory drawings of various components/ assemblies like Headstock, Facing Unit, Tool Holder Slide, Machine Bed, Feed Transmission System, Feed back System etc. of the machine with details of material & their hardness.	Vendor to Furnish	
2.1.2	Video images on CD / Hard copy of literature with photographs & drawings explaining the technical features should be enclosed with the offer	Vendor to Submit	
2.1.3	Machine should be Metric execution. (Construction wise)	Vendor to Confirm	
2.1.4	Head Stock Counter balancing System. (Details of the offered system to be submitted)	Vendor to Submit	
2.2	HEADSTOCK:		
2.2.1	Geared Head stock unit shall be of enclosed box type construction. The machine shall have a facing head also. Selection of spindle mode or facing head mode shall be through CNC system. It should be possible to use spindle without dismantling or removing the facing head.	Vendor to specify the arrangement of head- stock briefly.	
2.2.2	Spindle Diameter	Min. 150 mm Vendor to specify	
2.2.3	Spindle taper	Preferably ISO 50 Vendor to specify	
2.2.4.	Headstock Vertical travel on Y axis (above table surface)	2150 mm	
2.2.5	Min distance from spindle axis to table surface	150 mm	
2.2.6	Spindle travel (Z axis)	700 mm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.2.7	Feed rate for <b>Y&amp;Z</b> axes (Infinitely variable)	Vendor to specify	
2.2.8	<b>Y</b> axis rapid feed rate	Vendor to specify	
2.2.9	<b>Z</b> axis rapid feed rate	Vendor to specify	
2.2.10	Spindle speed (infinitely variable): <b>approx 5 – 2500 RPM</b>	Vendor to specify	
2.2.11	No of speed ranges (spindle)	Vendor to Specify	
2.2.12	Spindle speed range selection: Electro Hydraulic system through CNC.	Vendor to confirm	
2.2.13	Spindle drive power (AC Continuous Rating - S1): The spindle drive and motor shall be of Fanuc / Siemens. (Details of model, make, type etc. to be furnished in the offer)	Around 37 KW  Vendor to Specify	
2.2.14	Torque-Power-Speed characteristics of the spindle system to be submitted by the vendor along with offer	Vendor to submit	
2.2.15	Forward and reverse rotation of spindle motor with suitable braking mechanism.	Vendor to confirm	
<b>2.3</b>	<b>FACING HEAD:</b>		
2.3.1	Facing Head Diameter	Vendor to Specify	
2.3.2	Maximum Turning diameter O.D	1200 mm	
2.3.3	Speed of Rotation	Vendor to Specify	
2.3.4	Facing head Slide Traverse ( <b>U</b> axis): <b>Min. 250 mm</b>	Vendor to Specify	
2.3.5	Feed rate of <b>U</b> axis (Infinitely variable)	Vendor to Specify	
<b>2.4</b>	<b>ROTARY TABLE:</b>		
2.4.1	Table size: L x W	2400 mm X 2000 mm	
2.4.2	Maximum weight of the job (on table)	15,000 kgs.	
2.4.3	Min distance from facing head to edge of table	Vendor to specify	



Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.4.4	Table or column Longitudinal travel ( <b>W</b> axis)	1500 mm	
2.4.5	Table or column Cross travel ( <b>X</b> axis)	2200 mm	
2.4.6	Feed rate for <b>W &amp; X</b> axes	Vendor to specify	
2.4.7	Rapid Feed rate for <b>W &amp; X</b> axes	Vendor to specify	
2.4.8	Table rotation : <b>B</b> axis	360°	
2.4.9	Table Indexing positions	3,60,000 positions	
2.4.10	4x90° precision indexing with locking arrangement Vendor to furnish locking arrangement details	Vendor to confirm	
2.4.11	Table rotary movement feed	0.1 to 1 rpm	
2.4.12	T slot size	Vendor to specify	
2.4.13	T slot pitch	Vendor to specify	
<b>2.5</b>	<b><u>Metallic Telescopic Covers</u></b> Metallic Telescopic Covers (walk on type) of rust resistant material to be provided with wipers for the traversing axes. Telescopic covers should be sealed to avoid mixing of coolant & hydraulic oil. Column guide ways are to be completely covered.	Vendor to Confirm	
<b>2.5.1</b>	<b>CHIP AND COOLANT SPLASH GUARD:</b> Guard is to be provided to protect the area around the machine against flying chips and coolant splash. Vendor to furnish the details.	Vendor to specify	
<b>2.6</b>	<b>FEED DRIVE SYSTEM:</b>		
2.6.1	Feed drive motors [AC servo motors] shall be digital type of Fanuc / Siemens (Details of model, make, type etc. to be furnished in the offer)	Vendor to specify	
2.6.2	Feed back system: Fanuc/ Siemens/ Heidenhein encoders. (Details to be furnished in the offer)	Vendor to specify	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.6.3	<b>Type of power transmission:</b> Pre-loaded backlash-free re-circulating ball screw drive for feed drive axes. Detailed Specification for all ball screws used in the machine shall be submitted. The specification shall address the following points: (a) Diameter, (b) Pitch (c) Length (d) Make (e) Model	Vendor to specify	
2.7	<b>OPERATION AND CONTROL SYSTEM:</b>		
2.7.1	<b>OPERATOR'S PANEL:</b> Operator's panel having complete CNC and machine control system with monitor of required configuration shall be provided for convenient and efficient operation. All switches should be within reach of operator. All displays/indications should be conveniently placed. Chip / splashguard shall be provided for the operator. (Layout showing complete details should be submitted with the offer)	Vendor to Submit	
2.7.2	<b>CNC SYSTEM &amp; FEATURES:</b>		
2.7.2.1	<b>Make:</b> Fanuc / Siemens	Vendor to specify	
2.7.2.2	<b>Type:</b> PC based latest version (With Simultaneous interpolation of three axes)	Vendor to confirm	
2.7.2.3	<b>Model:</b> Suitable and Latest version, as available at the time of ordering, should be supplied.	Vendor to confirm	
2.7.2.4	<b>Details of Standard features.</b> List to be submitted by vendor.	Vendor to Submit	
2.7.2.5	<b>Details of optional features:</b> Optional features recommended by vendor to be submitted.	Vendor to Submit	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.7.2.6	The system should have full alphanumeric keyboard, TFT colour display (preferably 17"), additional draw-out type QWERTY Key Board and mouse in suitable enclosure, RS232C serial interfaces, parallel interface for printer, COM port for telediagnosics, network ready for LAN, electronic hand wheels for all axes, CD/DVD drive unit with writer for data input/output, hard disk of sufficient capacity (not less than 80 GB), graphic simulation and preinstalled system software & other required software etc. (Details should be submitted by Vendor).	Vendor to Confirm & Vendor to Submit	
2.7.2.7	The system should have a meter for showing the spindle power	Vendor to Confirm	
2.7.2.8	The CNC system should have a feature for locking axes through M codes.	Vendor to Confirm	
2.7.3	<b>MANUAL CONTROL:</b> Complete manual control of machine with required switches / keys should be provided on operator's panel for selection of required axis, axis direction, cutting feed, spindle rpm, Direction of Spindle Rotation (with inching) i.e. CW/ CCW, cutting feed and spindle rpm on/off, display of axis position values etc, for manual operation without using CNC program or MDI mode. (Diagram/ Sketches for switches/ keys provided on operator's pendant to be submitted).	Vendor to Confirm & Vendor to Submit	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.7.4	<b>HAND HELD UNIT:</b> Hand Held unit with sufficient length of interfacing cable for axis selection, axis movement with pulse generator and axis position display and emergency stop is to be offered with complete details. This is required for job setting.	Vendor to Confirm & Vendor to Submit	
2.7.5	<b>UPS FOR CNC SYSTEM:</b> UPS of 30 minutes for CNC system with inbuilt cooling and charge status display	Vendor to specify	
2.8	<b>MACHINE LIGHTS:</b>		
2.8.1	Machine Lights for sufficient illumination of complete working area on all sides of operator's location should be provided.	Vendor to Confirm	
2.8.2	A magnetic base portable spotlight with sufficiently long cable should also be provided.	Vendor to Confirm	
2.8.3	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents.	Vendor to Confirm	
2.8.4	Flashing / rotary type End of Cutting and Program Stop Light.	Vendor to Confirm	
2.8.5	Voltage shall be 24 V for the hand lamp.	Vendor to Confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
<b>2.9</b>	<b>AIR CONDITIONERS:</b> Air Conditioners with Dehumidifiers of suitable capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions.  <b>Make:</b> Rittal / Warner & Finley or any other reputed make acceptable to BHEL. Detailed specifications to be submitted.	Vendor to Submit	
<b>2.10</b>	<b>HYDRAULIC SYSTEM:</b>		
2.10.1	Make: Rexroth / Vickers Sperry.	Vendor to specify	
2.10.2	Hydraulic system should be centralized. Hydraulic Tank shall preferably be located at floor level All hydraulic pipelines to be neatly laid out. (Details should be furnished at contract stage)	Vendor to Confirm	
2.10.3	Hydraulic circuits shall be designed with minimum number of control valves and to suit oil of ISO VG 46 or 68 only. Also minimum number of check- points to be provided wherever pressure is required to be measured for setting and trouble shooting. MINIMESS Pressure Gauge - 1 No with Connecting Hose to be provided.	Vendor to Confirm	
2.10.4	The control voltage for all solenoid operated valves	24 V DC	
2.10.5	Filtration System.	Vendor to specify	
2.10.6	Failure indication:	Vendor to specify	
2.10.7	Automatic shut off provision.	Vendor to specify	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.10.8	Refrigerated type cooling system of sufficient capacity to maintain complete Hydraulic System, including lubrication oil, hydraulic oil and gearbox oil, etc. at a temperature not exceeding 50 °C irrespective of the ambient conditions. Vendor should submit complete details.	Vendor to specify	
2.10.9	Hydraulic pump capacity (flow / pressure)	Vendor to specify	
2.10.10	Each pump should have an independent motor.	Vendor to Confirm	
2.11	<b>First filling of all required Oils &amp; Grease etc.</b> Should be supplied by vendor. <b>Oil grade:</b> ISO VG46 or 68 <b>Grease:</b> Servo gem grade 2 (preferred) Indigenous (Indian) source or Indian equivalent and specifications of oils/ greases are also to be provided by the vendor.	Vendor to specify	
2.12	<b>COOLANT SYSTEM:</b>		
2.12.1	Coolant System with all accessories for following types shall be provided. Selection of required type shall be enabled through program as well as manual (by push buttons on the Operator's panel).	Vendor to Confirm	
2.12.2	a) Re-circulating type Flood Coolant System.	Vendor to Confirm	
2.12.3	b) High Pressure Coolant system through Spindle.	Vendor to Confirm	
2.12.4	Coolant Pressure for each type to be furnished.	Vendor to Furnish	
2.12.5	Coolant flow rate for each type be furnished.	Vendor to Furnish	
2.12.6	All Spindle mounted tool holders, boring bars and adapters etc. shall have through tool coolant provision.	Vendor to Confirm	
2.12.7	Coolant collection and re-circulation system shall be leak proof to avoid spillage on shop floor.	Vendor to Confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.12.8	<b>Coolant Filtration System:</b> Re-circulating type with suitable filtration unit. Vendor shall give details of offered filtration unit.	Vendor to specify	
2.12.9	Coolant Flow Diagram showing filters, pumps, valves, tanks etc. to be submitted with the offer.	Vendor to Submit	
2.12.10	Coolant pump & motor details for all types of coolant system are to be submitted with the offer.	Vendor to specify	
2.12.11	For finer control of Pressure and Coolant Flow Rate, after its activation through program or switches, Rotary/ potentiometer switches shall be provided on the Operator's Panel.	Vendor to Confirm	
2.12.12	The coolant tank should be fitted with skimmer for regular cleaning of coolant from contamination with tramp oil.	Vendor to Confirm	
<b>2.13</b>	<b>ELECTRICAL SYSTEM:</b>		
2.13.1	415V $\pm 10\%$ , 50HZ $\pm 3$ 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 required material details is to be informed by vendor well in advance so that it could be incorporated during construction of foundation.	Vendor to specify	
2.13.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized	Vendor to Confirm	
2.13.3	All electrical & electronic control cabinets & panels should be dust and vermin proof and shall have IP 54 protection.	Vendor to Confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.13.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to Confirm	
2.13.5	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	
2.13.6	Motors shall conform to IEC or Indian Standards	Vendor to Confirm	
2.13.7	All cables moving with traversing axes should be installed in Caterpillar/ Drag chain. Additionally, all the cable trays required for laying the cables shall be included in the offer.	Vendor to Confirm	
2.13.8	Vendor should ensure proper earthing for the machine and its peripherals.	Vendor to Confirm	
2.13.9	In-cycle hour counter with reset facility and digital energy meter is to be included in the offer.	Vendor to Confirm	
<b>2.14</b>	<b>SAFETY ARRANGEMENTS:</b>		
2.14.1	Following safety features in addition to other standard safety features should be provided in the machine:	Vendor to Confirm	
2.14.2	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. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on CNC display and panels) should be available	Vendor to Confirm	
2.14.3	A detailed list of all alarms / indications provided in the machine should be submitted by the supplier.	Vendor to Submit	



Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.14.4	All the pipes, cables etc. on the machine should be well supported and protected.	Vendor to Confirm	
2.14.5	All rotating parts of the machine should be provided with guards and should be statically & dynamically balanced to avoid undue vibration.	Vendor to Confirm	
2.14.6	Emergency Switches at suitable locations as per International Norms are to be provided	Vendor to Confirm	
2.14.7	Oil & water pipe lines should not run with electrical cable in the same tray / trench.	Vendor to Confirm	
<b>2.15</b>	<b>ENVIRONMENTAL PERFORMANCE OF THE MACHINE:</b>		
2.15.1	The Machine should confirm to following factors related to environment:	Vendor to Confirm	
2.15.2	Maximum noise level shall not exceed 85 dB(A) at normal load condition, 1 meter away from the machine.	Vendor to Confirm	
2.15.3	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Vendor to Confirm	
2.15.4	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to specify	
2.15.5	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor to Confirm	
<b>3.0</b>	<b>SERVO VOLTAGE STABILIZER:</b>		
3.1	Indian make Oil / Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc with no undesirable Harmonics in the stabilizer output.	Vendor to specify	
3.2	Make. : NEEL / DELTA / AEI / POWER AID	Vendor to specify	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
3.3	Model & Rating (Suitable for the machine load. Vendor to specify the noise level also)	Vendor to specify	
3.4	Spares Package for the Voltage Stabilizer for 2 years working should also be offered.	Vendor to Confirm	
3.5	Catalogue of the Voltage Stabilizer shall be submitted with the offer.	Vendor to Submit	
<b>4.0</b>	<b>ULTRA ISOLATION TRANSFORMER</b>		
4.1	Ultra Isolation Transformer (Indian make) suitable for complete machine, its drives, controls & PLC etc. shall be supplied.	Vendor to Confirm	
4.2	Make: NEEL / DELTA / AEI / POWER AID	Vendor to specify	
4.3	Model and Rating:	Vendor to specify	
4.4	Spares Package for the Ultra Isolation Transformer for 2 years working should also be offered.	Vendor to Confirm	
4.5	Catalogue of the Ultra Isolation Transformer shall be submitted with the offer.	Vendor to Submit	
<b>5.0</b>	<b>COMPRESSED AIR POINTS:</b> BHEL will provide compressed air at 60 to 70 psi at one point. The vendor shall indicate the inlet point for compressed air in the layout drawing of the machine.	Vendor to Confirm	
<b>6.0</b>	<b>TOOLING:</b>		
6.1	<b>List of tooling required:</b>	Vendor to specify	
6.1.1	Please refer <b>Annexure-4 &amp; 5</b> for near about model of Tool holding arrangement for facing head operations.		

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
6.1.2	For <b>Turning/Boring</b> with Facing Head, the following tools shall be supplied: a) Base tool holder 300mm long to suit U-axis slide: 2 Nos. b) Base tool holder 600mm long to suit U-axis slide: 2 Nos. c) Extension Bars <b>for turning/boring</b> as given below: i) Extension Bar of length L = 1000mm: 1 No. ii) Extension Bar of length L = 750mm: 1 No. iii) Extension Bar of length L = 500mm: 1 No. iv) Extension Bar of length L = 300mm: 1 No. These extension bars shall be used with the base tool holders specified under clause 6.1.2 a& b.	Vendor to Confirm	
6.1.3	For <b>Facing operation</b> with Facing Head, the following tools shall be supplied: i) Extension Bar of length L = 200mm: 1 No. ii) Extension Bar of length L = 500mm: 1 No. i) Extension Bar of length L = 800mm: 1 No. These extension bars shall be used with the base tool holders specified under clause 6.1.2 a& b.	Vendor to Confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
6.1.4	<b>For milling:</b> the following items shall be supplied, suitable to the spindle: <b>1)</b> Adaptor for face mill cutter $\phi 250\text{mm}$ = 1 No. <b>2)</b> Collet type Adaptors of following sizes a) With Collet 25mm: 1 No b) With Collet 32mm: 1 No c) With Collet 36mm: 1 No d) With Collet 40mm: 1 No e) With Collet 50mm: 1 No <b>3)</b> MT (screwed end) Adaptors for following a) MT2 =1 No. b) MT3 =1 No. c) MT4 =1 No. d) MT5 = 1 No.	Vendor to Confirm	
6.1.5	<b>For Drilling:</b> the following items shall be supplied, suitable to the spindle: Adaptors for following tang end Morse tapers. a) MT2: 1 No b) MT3: 1 No c) MT4: 1 No d) MT5: 1 No	Vendor to Confirm	
6.3	<b>QUICK CHANGE TAPPING ATTACHMENTS:</b> Quick change Tapping attachment shall be supplied for Thread Diameter Range: M16 to M45. (Prove out to include tapping of prove out jobs listed in Annexure- 1)	Vendor to Confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
6.4	<b>For Job holding:</b> The following items shall be supplied. a) Two Sets of V Blocks (in pairs) to accommodate job diameters ranging from 300mm to 1200mm. b) Two pairs of Clamping chains preferably with ratchet mechanism and Tenons to suit the table T-Slots.	Vendor to Confirm
6.5	All cutting tools, tool holders, arbors, boring bars, clamping elements etc. shall be supplied for machining of prove-out components. Itemized pricing of the cutting tools, tool holders, arbors, boring bars must be indicated separately in the commercial offer The technical offer should contain the unpriced list.	Vendor to specify
7.0	<b>MEASURING SYSTEM:</b> Automatic job measuring system, comprising of Spindle Mounted Renishaw make Wireless system, with measuring cycles, calibration system and all types of probes/ styli required for measuring all machined dimensions of the prove-out components. Vendor to furnish detailed description of the system along with offer.	Vendor to specify

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
<b>8.0</b>	<b>DIAGNOSTIC SYSTEM:</b>		
<b>8.1</b>	<b>TELE DIAGNOSTIC SYSTEM:</b> Tele-diagnostic service should be provided through International telephone lines along with required Hardware / Software package for the supplied CNC system for remote diagnosis and correction of the problems in both CNC System and PLC of the machine. This should be provided free of charge for the guarantee period. Vendor should inform terms and conditions for this service after guarantee period. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future.	Vendor to confirm	
<b>9.0</b>	<b>FAULT DIAGNOSTIC SYSTEM:</b>		
9.1	Supplier's own diagnostic system with required hardware and software should be supplied and installed on the CNC system. This should include customized auto-diagnostic system with supporting hardware and software, which shows detailed cause, and remedy for the fault on the display for faults related to mechanical and electrical maintenance.	Vendor to specify	
9.2	Help guide should be provided to use both diagnostic systems	Vendor to Confirm	
<b>10.0</b>	<b>PORTABLE DATA LOADING DEVICE: (optional)</b> Portable Data loading device with sufficient length of interface cable, HDD of size not less than 40GB, CD Drive, TFT Display of size 14" and suitable preinstalled software for loading PLC program, RS 232 Port, Ethernet chord, USB port, Machine data and CNC part programs shall be supplied with the machine. Vendor should furnish details.	Vendor to specify	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
11.0	<b>LEVELING &amp; ANCHORING SYSTEM:</b> Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc shall be supplied for the Machine, Rotary Table, Floor Plates etc.	Vendor to Confirm	
12.0	<b>TOOLS FOR OPERATION &amp; MAINTENANCE:</b> The vendor shall supply special tools required for the operation and maintenance of the machine. The vendor shall also supply necessary standard tools like Torque Wrench, Spanners, Keys, grease guns etc. for operation and maintenance of the machine. List of all such Special and standard tools shall be submitted with offer	Vendor to Confirm Vendor to Submit	
13	<b>SPARES:</b>		
	The Vendor shall recommend and submit list of spares required for the machine for two years of trouble free operation on three shifts /day basis under two headings as a) <b>Mechanical &amp; hydraulic spares</b> and b) <b>Electrical &amp; electronic spares.</b> The list shall generally include the following items.  <b>a) Mechanical &amp; hydraulic spares:</b> The list may generally include all types of pumps, Valves, pressure switches / transducers, filters, seals etc.		

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
13.1	<p><b>b) Electrical &amp; electronic spares:</b> The list may generally include all types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Scanning Heads for Linear Scales, MMC module, NCU module, Operator's panel with Display Unit, Floppy Disk Unit, I/O Cards for PLC, Servo Motors for Feed Drives, Power Module &amp; Control Cards for Main Drive as well as Feed Drives etc.</p> <p><b>c) Un-priced list</b> of spares with quantities, specified at <b>a&amp;b</b> above, should be submitted with this technical offer.</p> <p><b>d) Unit Price</b> of each item figuring in <b>c</b> shall be submitted in a sealed cover with the commercial bid to capital purchase department of BHEL.</p>	Vendor to Submit
13.2	All types of spares for the total machine and its accessories should be available for minimum ten years, after supply of the machine. If any spares or controls are likely to become obsolete within this period, the vendor should inform BHEL and provide details of it's suppliers to enable BHEL to procure them in advance.	Vendor to Confirm



Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
13.3	In case of ordering, a complete list of spares for the machine and its accessories along with spares specification / type / model, and name & address of the spare supplier shall be submitted along with documentation while supplying the machine.	Vendor to Confirm	
<b>14.0</b>	<b>DOCUMENTATION:</b>		
14.1	3 sets of following documents (3 Hard copies) in English language should be supplied along with the machine	Vendor to confirm	
14.2	Operating manuals of Machine & CNC system	Vendor to confirm	
14.3	Programming Manuals of Machine & CNC system	Vendor to confirm	
14.4	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic / Lubricating circuit diagrams.	Vendor to confirm	
14.5	Maintenance, Interface & commissioning manuals for CNC system, spindle & feed drives.	Vendor to confirm	
14.6	Manufacturing drawings for all supplied tool holders, coolant connections, adapters, sleeves, fixtures etc.	Vendor to confirm	
14.7	Catalogues / O&M Manuals of all bought out items.	Vendor to confirm	
14.8	Detailed specification of all rubber items and hydraulic/lube fittings	Vendor to confirm	
14.9	<b>Bearings:</b> Make& Specification for all bearings used in the machine.	Vendor to Specify	
14.10	<b>Ball Screws:</b> Detailed Specification for all ball screws used in the machine shall be submitted. The specification shall address the following points: (a) Diameter (b) Pitch (c) Length (d) Make (e) Model	Vendor to specify	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
14.11	Operating Manuals, Maintenance Manuals & Catalogues for Isolation Transformer and voltage stabilizer.	Vendor to confirm	
14.12	PLC program printouts (Ladder diagram & Statement list) with comments in English.	Vendor to confirm	
14.13	PLC program on CD, NC data & PLC data on CD.	Vendor to confirm	
14.14	Complete back up of hard disk on GHOST CD and clear written Instructions (1 copy) to take back up and reloading of a new hard disk.	Vendor to confirm	
14.15	The vendor shall submit complete Master List of parts used in the machine.	Vendor to Submit	
14.16	One additional set of all the above documentation on CD ROM, wherever possible.	Vendor to confirm	
<b>15.0</b>	<b>TRAINING:</b>		
15.1	The Vendor shall train Three BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and CNC System) of the Machine at Vendor's works for a period not exceeding 5 working days.	Vendor to confirm	
15.2	Airfare, boarding & lodging for the BHEL Engineers shall be borne by BHEL.	Vendor to confirm	
15.3	The Vendor shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance after the commissioning of the Machine at BHEL works for not less than 8 working days		
15.4	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel	Vendor to confirm	
15.5	Vendor to quote on the basis of per man per Day for training at vendor's work	Vendor to specify	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
<b>16.0</b>	<b>FOUNDATION:</b>		
16.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI). Vendor shall submit complete foundation details including static and dynamic loads within three months after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for Voltage Stabilizer, Isolation Transformer, & any other accessories. BHEL shall construct complete foundation for the machine as per the Vendor's recommendation.	Vendor to confirm	
16.2	The Vendor shall indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the machine.		
<b>17.0</b>	<b>ERECTION &amp; COMMISSIONING</b>		
17.1	<p>1. Supplier to take full responsibility for supervision of the erection, start up, testing of machine, it's control system &amp; all other supplied equipment, machining of test pieces etc.</p> <p>2. Service requirement like power, air &amp; water shall be provided by BHEL at only one point to be indicated by supplier in their foundation or layout drawings.</p> <p>3. Other requirements like crane and helping personnel will be provided by BHEL, free of cost.</p>	Vendor to confirm	
17.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer shall also be responsibility of the vendor.	Vendor to confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
17.3	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, mentioned under the clause " <b>Machine Acceptance</b> " should form part of the commissioning activity.	Vendor to confirm	
17.4	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	
17.5	The supplier shall arrange commissioning spares required for commissioning of the machine.	Vendor to confirm	
17.6	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	
17.7	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to confirm	
17.8	Duration, terms & conditions for E&C should be furnished with the technical offer in detail.  Charges for Erection & Commissioning shall be submitted with the commercial offer.	Vendor to confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
<b>18.0</b>	<b>ACCURACY TESTS:</b>		
<b>18.1</b>	<b>GEOMETRICAL ACCURACY:</b>		
18.1.1	Geometrical Accuracy Tests shall be in accordance with ISO 3070 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	
18.1.2	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	
18.2	Machine positioning accuracies & repeatability should be measured as per VDI/DGQ 3441 / ISO 230 - 2 (Latest Revision) using LASER INTERFEROMETER.	Vendor to confirm	
18.2.1	Positioning Accuracy on traversing axes (Pa per 1000mm)	$\pm 0.016$ mm	
18.2.2	Positioning Accuracy Pa for B-axis	$\pm 3.6$ sec	
18.2.3	Repeatability on traversing axes (Ps per 1000mm)	$\pm 0.008$ mm	
18.2.4	Repeatability Ps for B-axis	$\pm 3.6$ sec	
18.2.5	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance at Suppliers works and during Erection & Commissioning at BHEL Works	Vendor to specify	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
19.0	AMBIENT CONDITIONS & THERMAL STABILITY:		
19.1	Power Supply : AC 415 V ±10% Frequency : 50 Hz ±3HZ Phases : 3 phase 3 wire system Compressed air supply: 60-70 psi Ambient Temperature: max 45 °C Relative Humidity = 85%  (Vendor to confirm that machine is suitable for above conditions)	Vendor to confirm	
19.2	Weather conditions are tropical. Atmosphere may be dust laden during some part of the year. Machine will be installed in the normal shop floor condition.  (Vendor to confirm that machine is suitable for above conditions.)	Vendor to confirm	
19.3	Thermal Stability of the machine shall be good enough to withstand the specified ambient conditions in order to meet the accuracy requirements of BHEL components. Vendor to confirm for trouble-free operation of the machine.	Vendor to confirm	
19.4	The Vendor should confirm that the machine and its accessories is suitable for continuous operation at its full capacity for 24 hours a day and 7 days a week through out.	Vendor to confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
<b>20.0</b>	<b>PROVEOUT OF BHEL COMPONENTS:</b>	
20.1	<p><b>1.</b> Drawings of prove-out components are enclosed. Please refer <b>Annexure 1</b> for prove out components List and operations. Material for the prove-out components will be provided by BHEL.</p> <p><b>2.</b> For machining of prove-out components, Job setting plan, Machining process plan and Requirement of tools etc. shall be discussed and agreed mutually.</p> <p>(Final prove out component drawing number may change, however, the machining features of the changed components shall be in line with the original component drawing.)</p> <p><b>3.</b> Using CNC programs of the vendor, Complete machining of prove-out components shall be done by vendor at BHEL works to the specified design accuracy and surface finish.</p> <p><b>4.</b> The vendor shall supply all cutting tools, tool holders, arbors, boring bars etc. necessary for machining of prove-out components.</p> <p><b>5.</b> Vendor shall submit final job setting plan, machining process plan, tool layout &amp; list with complete description, time studies etc. within two months of placement of order for the prove- out components. Vendor shall submit CNC Programs prior to start of erection of machine at BHEL Works.</p>	Vendor to Confirm

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
20.1 Contd.	6. Vendor shall be fully responsible for machining of prove-out components as per drawing and other requirements specified by BHEL. Clarifications regarding accuracy requirements of the prove-out components, whether specified or not, should be discussed by vendor during initial technical discussions.	Vendor to Confirm
<b>21.0</b>	<b>MACHINE ACCEPTANCE:</b>	
<b>21.1</b>	<b>Tests/Activities to be carried out at supplier's works on the machine before dispatch:</b>	Vendor to Confirm
21.1.1	Geometrical Accuracy Tests as per test chart provided by the vendor.	Vendor to Confirm
21.1.2	Positioning Accuracy Tests as per VDI-DGQ/3441 / ISO 230 - 2	Vendor to Confirm
21.1.3	The machine shall be test run continuously for 48 hrs. If any break down occurs during this test, the test will be repeated again for 48 hrs from restarting.	Vendor to Confirm
21.1.4	Demonstration of all features of the machine, CNC system and all Accessories.	Vendor to Confirm
21.1.5	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to Confirm
<b>21.2</b>	<b>Tests/Activities to be carried out at BHEL works while commissioning the machine:</b>	Vendor to Confirm
21.2.1	Geometrical Accuracy Tests as per test chart	Vendor to Confirm
21.2.2	Positioning Accuracy Tests as per VDI-DGQ/3441 / ISO 230 - 2	Vendor to Confirm
21.2.3	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to Confirm



Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
21.2.4	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
21.2.5	Demonstration of all features of the machine, CNC system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Vendor to Confirm
21.2.6	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	Vendor to Confirm
21.2.7	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to Confirm
21.2..8	Prove-out of BHEL components	Vendor to Confirm
22.0	<b>PACKAGING:</b> Sea worthy & rigid packing for all items of complete machine, CNC System, all Accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes	Vendor to Confirm
23.0	<b>GUARANTEE:</b> 24 months from the date of acceptance of the machine.	Vendor to Confirm

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
<b>24.0</b>	<b>GENERAL:</b>		
24.1	The vendor should submit the following information:	Vendor to confirm	
24.2	Machine Model	Vendor to specify	
24.3	Total connected load (KVA):	Vendor to specify	
24.4	Floor area required (Length, Width, Height) for complete machine & accessories.	Vendor to specify	
24.5	Painting of Machine/ Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to Confirm	
24.6	Total weight of the machine	Vendor to specify	
24.7	Weight of heaviest part of machine	Vendor to specify	
24.8	Weight of the heaviest assembly/ subassembly of the Machine	Vendor to specify	
24.9	Dimensions of largest part/ subassembly of the machine	Vendor to specify	

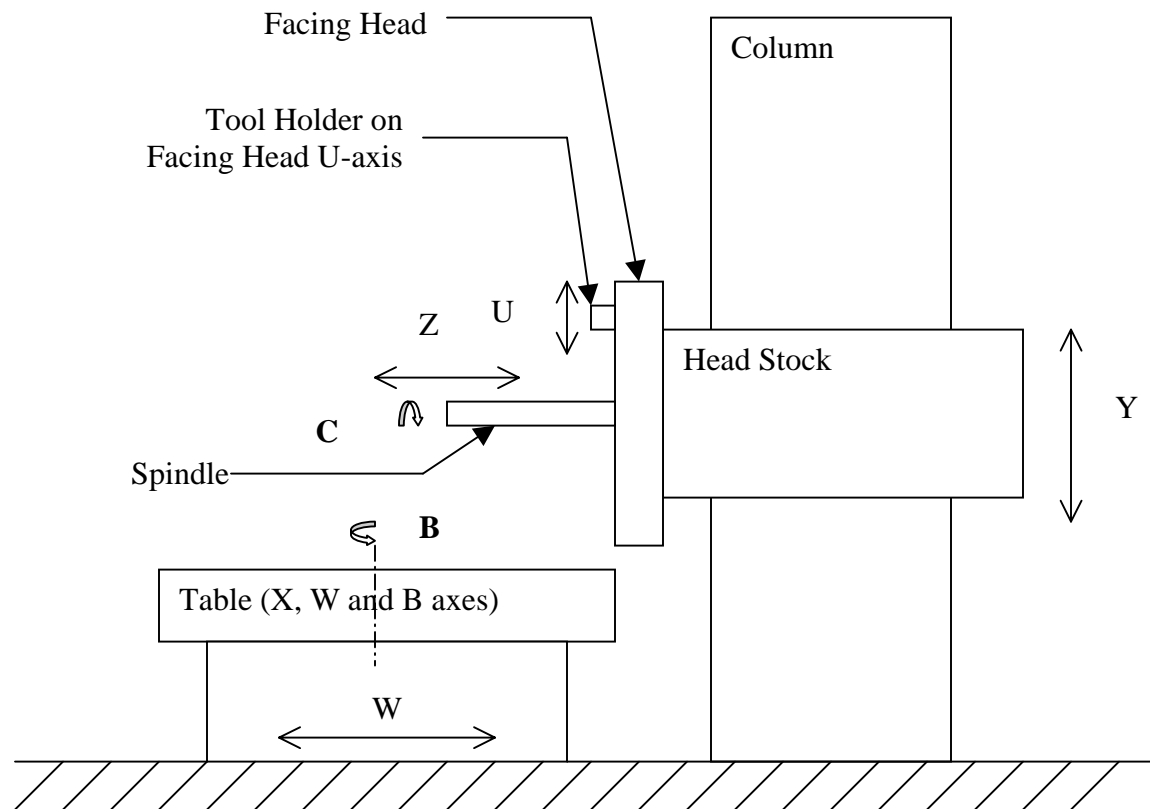
**Annexure - 1:** Table showing Prove out component list and operations.

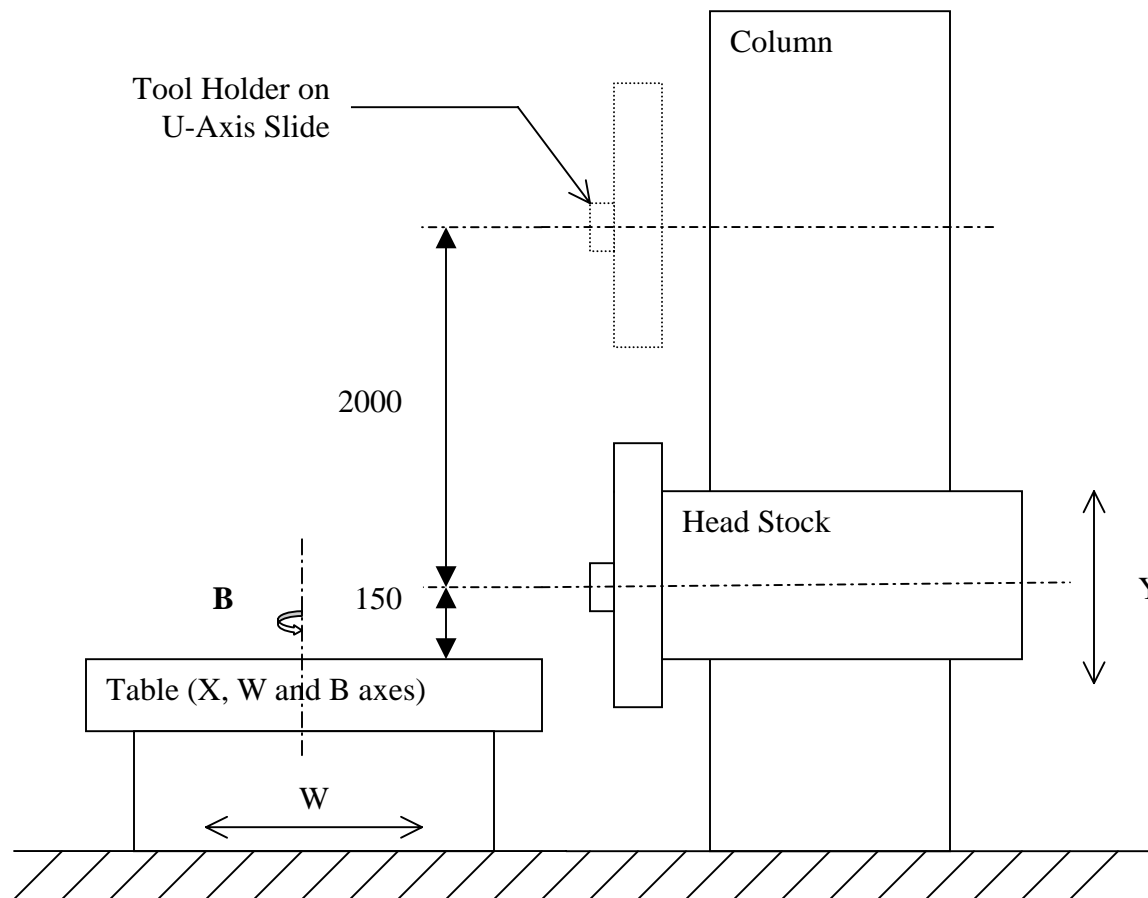
**Annexure - 2&3:** Sketch showing approximate configuration of the machine.

**Annexure - 4&5:** Sketch showing approximate configuration of Tool holders.

**Annexure - 1**

<b>Prove out job details for CNC Horizontal Boring Machines (150 Spindle)</b> <b>Qty: 2 Machines (Machine 1 &amp; Machine 2)</b>				
<b>Prove out job Description</b>	<b>Prove out Job qty</b>	<b>Prove out Drawing No.</b>	<b>Title of Drg.</b>	<b>Operations to be done</b>
GV 14" 2500 Body	1 No. (To be proved on Machine 1)	3V000021319	Body Assy	Seat Fine Facing
		2V000016417	Body Assy	Weld Cleaning, Sealing bore finish machining, Drilling and Tapping.
		2V000016411	Body Rough	All operations except guide machining.
		2V000016410R	Body	Reference drg.
QCNRV 32"150 Body	1 No. (To be proved on Machine 1)	3VL63422743	Body Assy	All operations as per Drg.
		2V000017338	Body Assy	All operations as per Drg.
		2V000017354	Body Rough	All operations as per Drg.
		2VL63417337R	Body	Reference drg.
FV 14" 2500 Body	1 No. (To be proved on Machine 2)	2V000015173	Body Assy	Third port finish machining, Hinge pin area finish machining, Weld Cleaning and Seat fine facing.
		2V000015172	Body Rough	Complete Machining as per Drg.
		2V000015044R	Body	Reference drg.
GV 32"600 Body	1 No. (To be proved on Machine 2)	1V000005195	Body	Complete Machining as per Drg.
		3V000023959	Body Assy	Sealing bore finishing, Weld Cleaning and Seat Fine Facing.
		1V000005194R	Body	Reference drg.

**Annexure 2: Approximate Configuration of CNC Horizontal Boring Machine**

**Annexure-3: Approximate Configuration of CNC Horizontal Boring Machine**

PSG

TVN

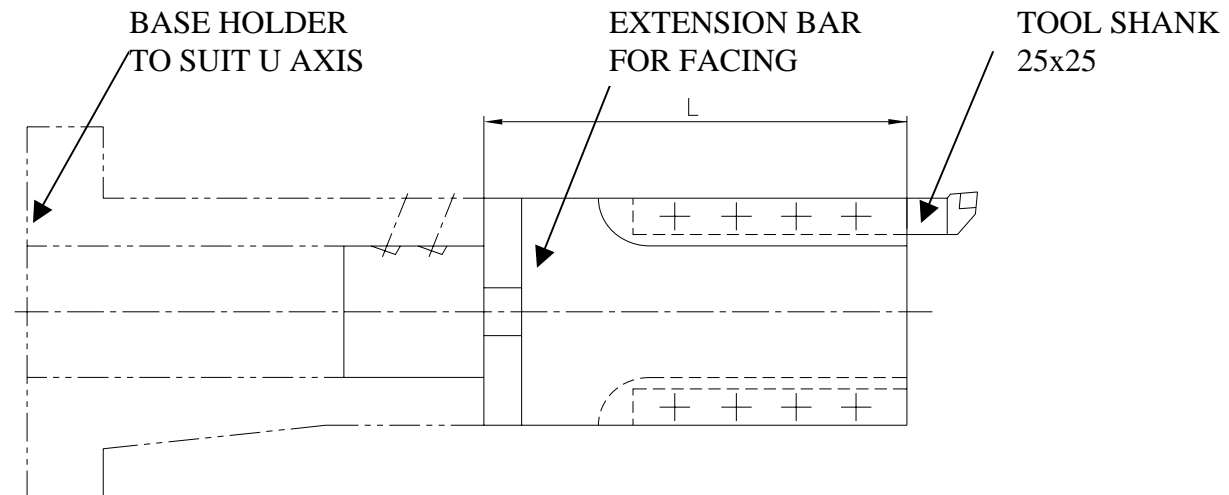
KPL

SSP

ARR

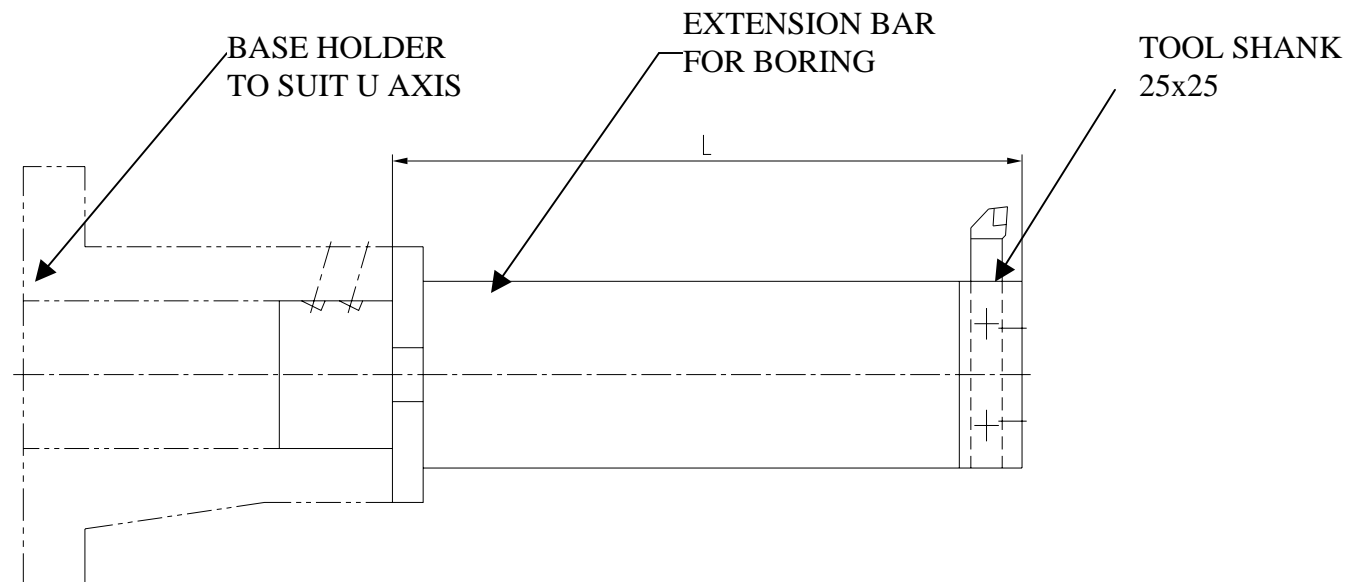
AVC

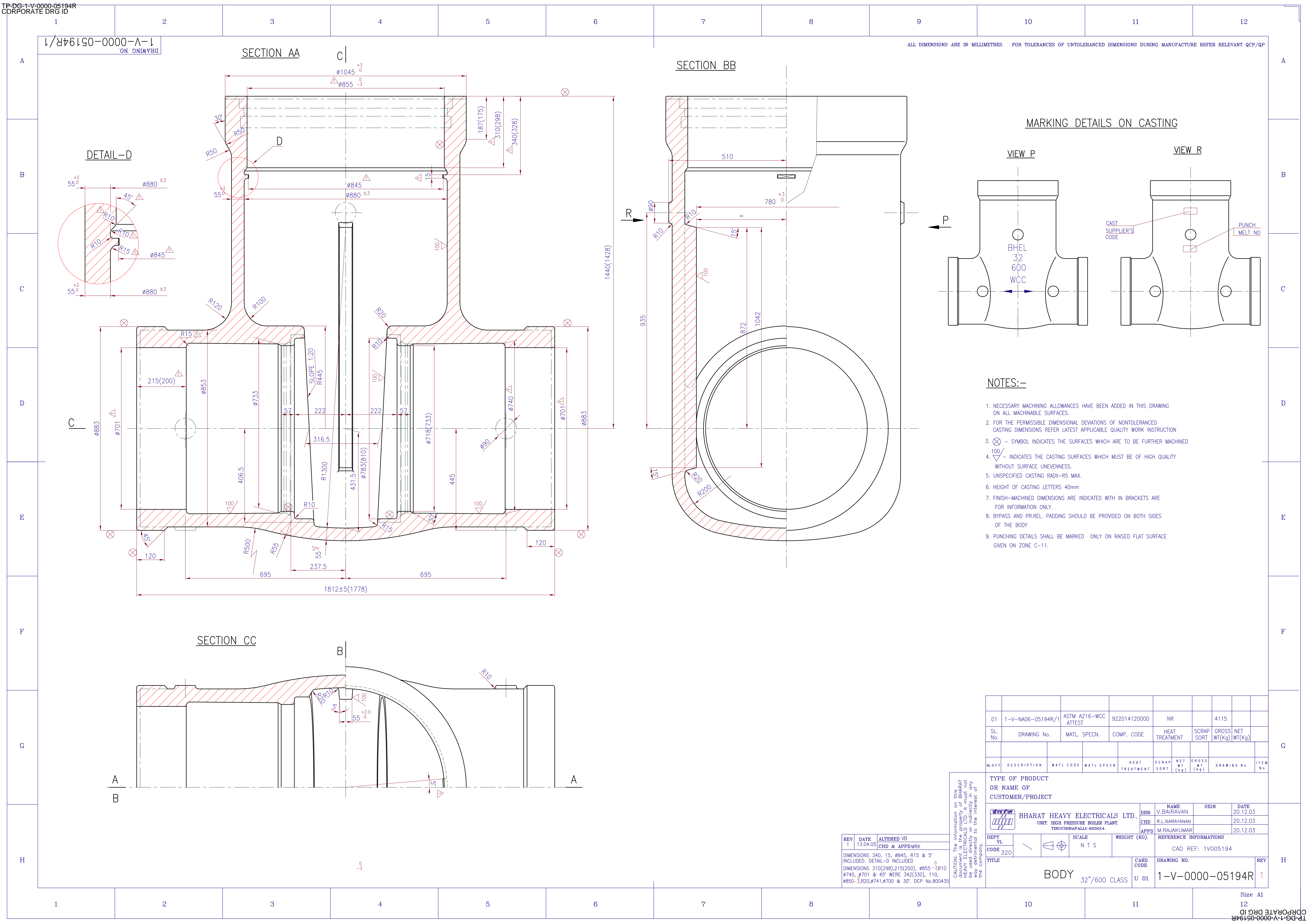
NRM

**Annexure-4: Approximate Configuration of Tool holder on U- Axis slide****FOR FACING**

**Annexure-5: Approximate Configuration of Tool holder on U- Axis slide**

**FOR BORING**



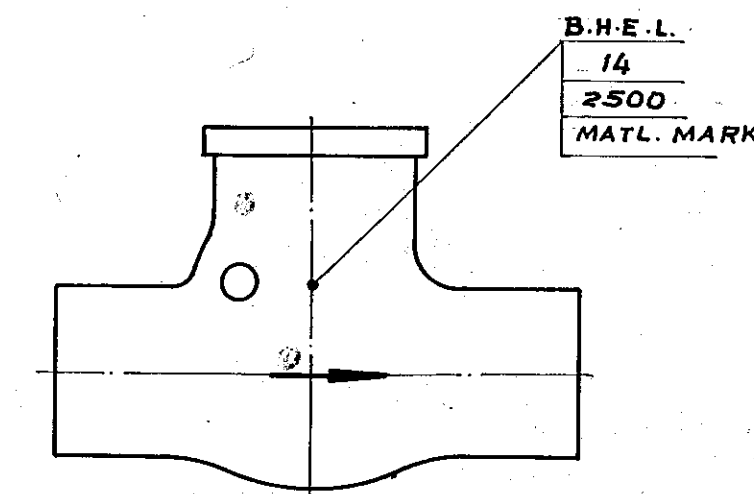
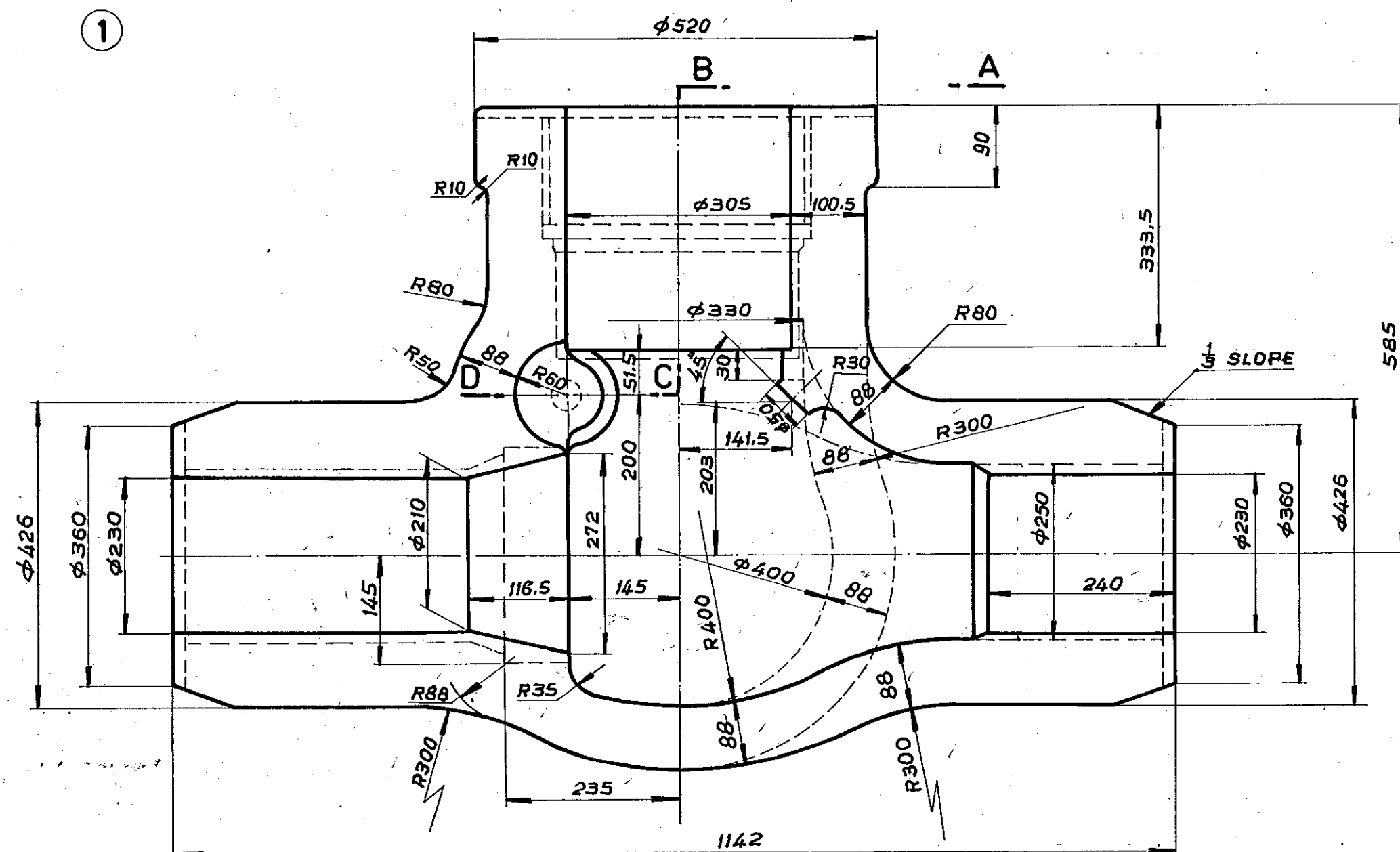




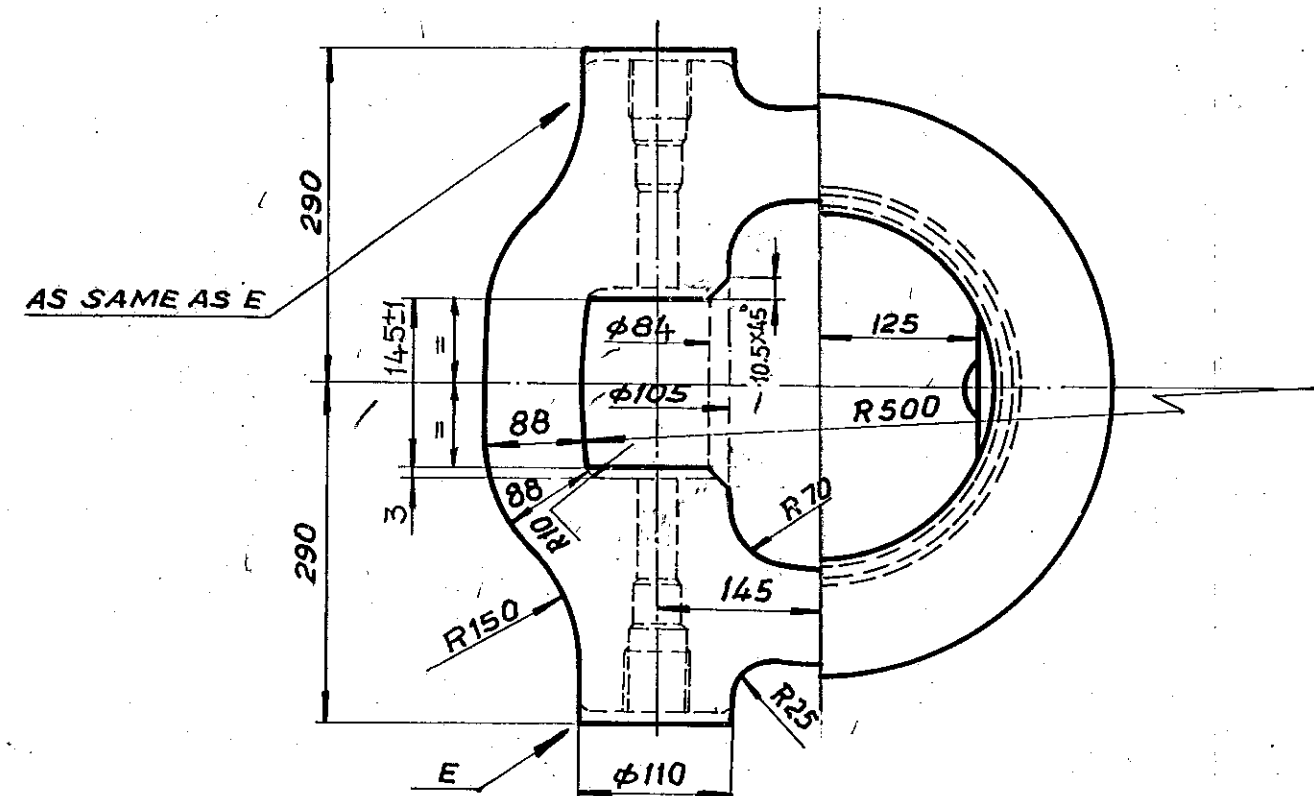


FIRST ANGLE PROJECTION (ALL DIMENSIONS IN MILLIMETRES)

REF. TABLE  
DRAWING NO. 2-V-0000-15047 R



SECTION-ABCD



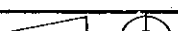
**NOTE :**

1. DOTTED LINES SHOWS FINISH MACHINED CONFIGURATION.
2. \* FOR THESE SPL. CLASS VALVES EMBOSHING SHALL BE 2500 SPL
3. \* ALL THE SPECIAL CLASS CASTINGS ARE TO BE SUBJECTED RT/UT ON ALL CRITICAL LOCATIONS.
4. \* ALL EXTERIOR AND ACCESSIBLE INTERIOR SURFACES OF BODY SHALL BE MPI/LPI TESTED.
5. FOR ALL OTHER DETAILS LIKE DIMENSIONAL TOLERANCE, HYDRAULIC TEST PRESSURE ETC. REFER LATEST APPLICABLE TDC:

8 *	2-V-L044-15044 R	A 217 WC9, ATTEST, NT	92 150 246	WC9
7 *	2-V-L043-15044 R	A 217 WC6, ATTEST, NT	92 150 247	WC6
6 *	2-V-L042-15044 R	A 216 WCC, ATTEST, AN	92 150 248	WCC
5 *	2-V-L041-15044 R	A 216 WCB, ATTEST, AN	92 150 249	WCB
4	2-V-L032-15044 R	A 217 WC9, ATTEST, NT	92 150 250	WC9
3	2-V-L031-15044 R	A 217 WC6, ATTEST, NT	92 150 251	WC6
2	2-V-L030-15044 R	A 216 WCC, ATTEST, AN	92 150 252	WCC
1	2-V-L029-15044 R	A 216 WCB, ATTEST, AN	92 150 253	WCB
SL.NO.	DRAWING NO.	MATL. SPECN.	MATL. CODE	MATL. MARK



**BHARAT HEAVY ELECTRICALS LTD.,**  
BOILER PLANT UNIT, TIRUCHIRAPALLI-620 014

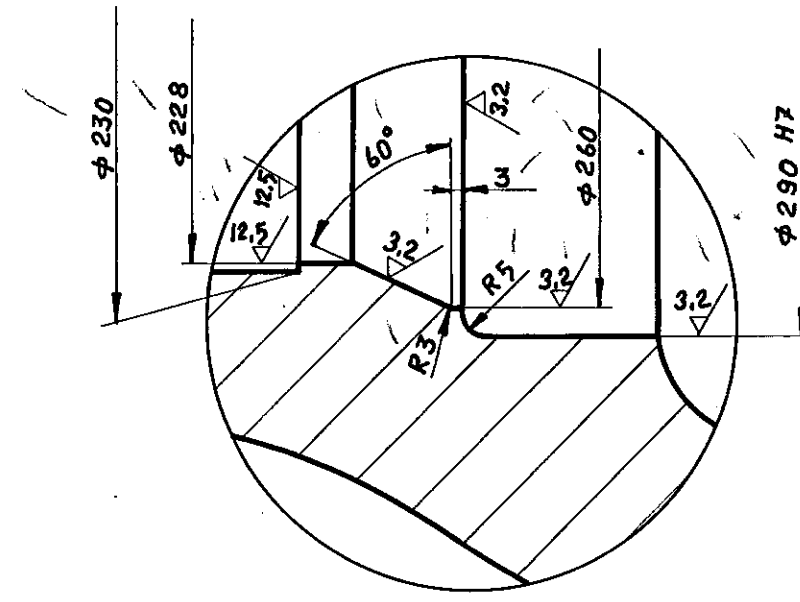
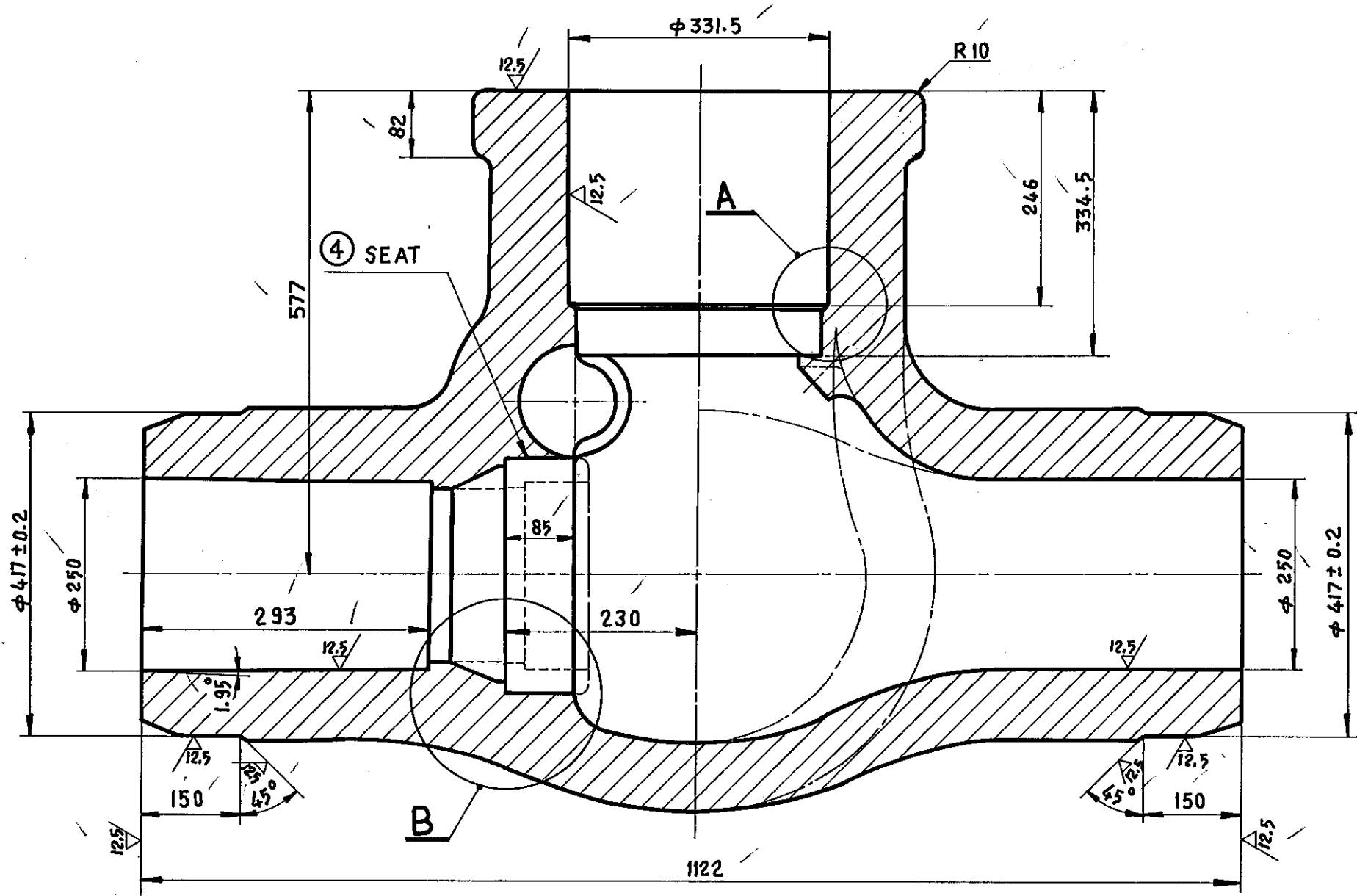
03 - 220/D																																			
DEPT	VL	CODE	320		SCALE	N.T.S.	WEIGHT (KG)	1356	REF. TO ASSY. DRG.	3-E 56 966 (479)																									
TITLE		BODY (CASTING DRAWING)				14"/2500C		<table border="1"><tr><td>DESIGNED</td><td>V. B. Raman</td><td>NAME</td><td></td><td>SIGN</td><td></td><td>DATE</td><td></td></tr><tr><td>CHECKED</td><td>M. R. K.</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>APPROVED</td><td>V. B.</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		DESIGNED	V. B. Raman	NAME		SIGN		DATE		CHECKED	M. R. K.							APPROVED	V. B.								
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APPROVED	V. B.																																		
A 4728 - 35-																																			
DIMENSIONS TO BE CONTROLLED WITHIN LIMITS AS SHOWN. MACHINING TOLERANCE $\pm 0.25$ UNLESS OTHERWISE SHOWN NON-MACHINING TOLERANCE $\pm$						1 CARD CODE U01		4 DRAWING NO. REF. TABLE 2-V-0000-15044R		15 16 R																									

SIZE A2

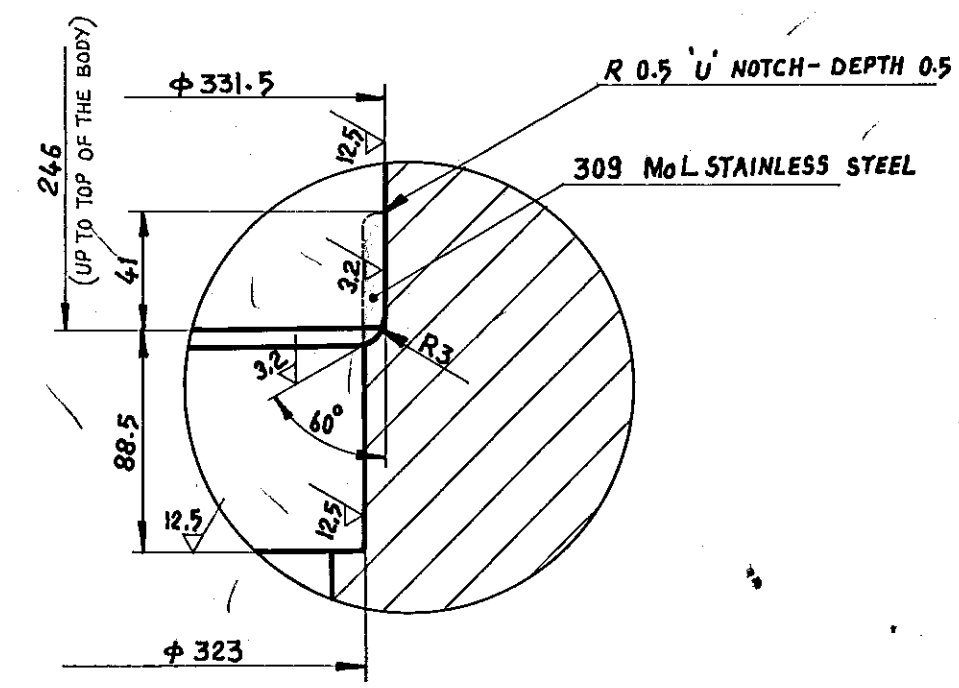
FOR TOLERANCE OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT ACP/AP.

1

φ 290  
H7 +0.052  
0



DETAIL-B



DETAIL-A

NOTE :-

1. LATEST APPLICABLE QUALITY PROCEDURE SHALL BE FOLLOWED IN ALL RESPECTS.
2. \* MARKED TYPES ARE SPECIAL CLASS RATINGS.

8 *	2-V-L044-15172/02	A 217 WC9, ATTEST, NT	93 112 370 8000	20
7 *	2-V-L043-15172/02	A 217 WC6, ATTEST, NT	93 112 369 8000	20
6 *	2-V-L042-15172/02	A 216 WCC, ATTEST, AN	93 112 368 8000	10
5 *	2-V-L041-15172/02	A 216 WCB, ATTEST, AN	93 112 367 8000	10
4	2-V-L032-15172/02	A 217 WC9, ATTEST, NT	93 112 366 8000	20
3	2-V-L031-15172/02	A 217 WC6, ATTEST, NT	93 112 365 8000	20
2	2-V-L030-15172/02	A 216 WCC, ATTEST, AN	93 112 364 8000	10
1	2-V-L029-15172/02	A 216 WCB, ATTEST, AN	93 112 363 8000	10
SL. NO.	ROUGH MACHINING ORG. No.	MATL. SPECN.	COMPONENT CODE	SCRAP SORT

**BHARAT HEAVY ELECTRICALS LTD.,**  
**BOILER PLANT UNIT, TIRUCHIRAPALLI-14**

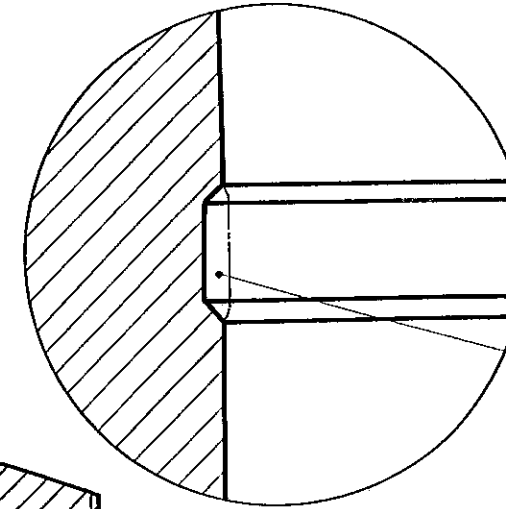
FIRST ANGLE	SCALE	DRAWN	K.N.C.	TOTAL NET WT.(KG)
	N.T.S	CHECKED	M.R.K. M. K. K.	TYPE
ALL DIMENSIONS IN MILLIMETRES		APPROVED	V.B.	TGA ORG No.
		DATE	23-8-87	NEW / OLD DRG. NO.

<b>CAUTION</b> THE INFORMATION CONTAINED IN THIS DRAWING IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LTD., BOILER PLANT UNIT, TIRUCHY-14 AND SHALL NOT BE USED WITHOUT THEIR EXPRESS WRITTEN PERMISSION IN ANY FORM OR PART THEREOF FOR ANY OTHER PURPOSE THAN FOR WHICH IT IS SENT TO YOU.	<b>BODY</b> (ROUGH MACHINING) 350/2500 C	DRAWING NO. <b>2-V-0000-15172</b>	REVISION <b>02</b>
--	--	--------------------------------------	-----------------------

REV. 02	DATE 20-11-96	ALT. V.A. M.	REV. 01	DATE 23-10-87	ALTERED K.R.SEKAR K.
NOTES UPDATED. DCN No. TA 0712		CHD & APPD. M.R.K. W.	CHECKED V.BABU K.		
		ZONE	TOLERANCE VALUE FOR φ 290 H7 CORRECTED		

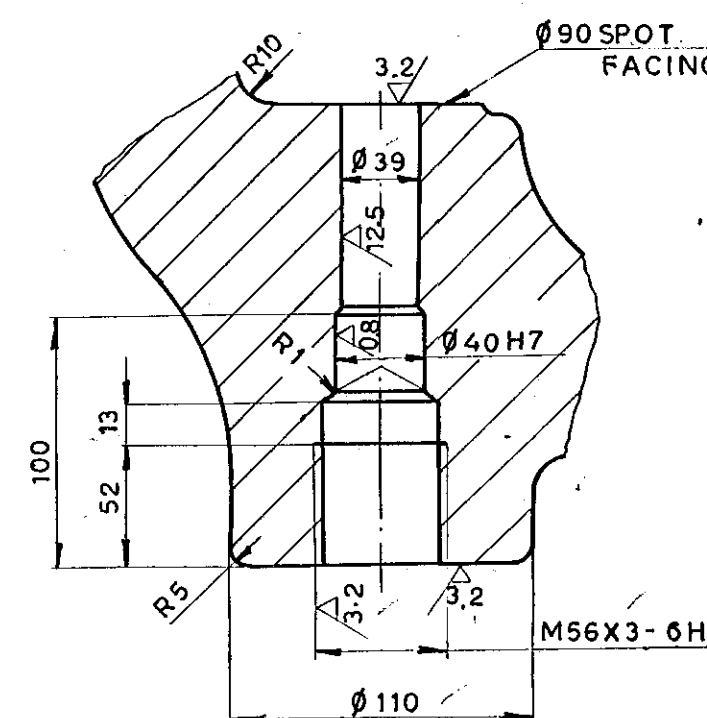
MF 758430

DRAWING NO. 2-V-0000-15173/08




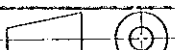
Ø325H7	+ 0.057
	0
Ø40H7	+ 0.025
	0.

1. \* MARKED TYPES ARE SPECIAL CLASS RATINGS.
2. LATEST APPLICABLE QUALITY PROCEDURE SHALL BE FOLLOWED IN ALL RESPECTS
3. EDGE PREPARATION SHALL BE AS PER SEPERATE INSTRUCTION.
4. \* EFFECTIVE DIA SHOULD BE FINISHED WITHIN THE RANGE OF  $\pm 0.3$  TO  $\pm 0.5$  FROM (17) RETAINING RINGS.



SECTION - CDEF

8*	2-V-L044-15173/02	A 217 WC9, ATTEST, NT 93 112 370 0000	91	ER 90 SB3 ATTEST	20
7*	2-V-L043-15173/02	A 217 WC6, ATTEST, NT 93 112 369 0000	91	ER 80 SB2 ATTEST	20
6*	2-V-L042-15173/05	A 216 WCC, ATTEST, AN 93 112 368 0000	91	E 7018 A1 ATTEST	10
5*	2-V-L041-15173/03	A 216 WCB, ATTEST, AN 93 112 367 0000	91	E 7018 A1 ATTEST	10
4	2-V-L032-15173/02	A 217 WC9, ATTEST, NT 93 112 366 0000	91	ER 90 SB3 ATTEST	20
3	2-V-L031-15173/02	A 217 WC6, ATTEST, NT 93 112 365 0000	91	ER 80 SB2 ATTEST	20
2	2-V-L030-15173/03	A 216 WCC, ATTEST, AN 93 112 364 0000	91	E 7018 A1 ATTEST	10
1	2-V-L029-15173/02	A 216 WCB, ATTEST, AN 93 112 363 0000	91	E 7018 A1 ATTEST	10
S.NO.	DRG. NO.	MATL SPECN COMP CODE	PART NO.	JOINING WELD MATL	SCRAP SORT

		<b>BHARAT HEAVY ELECTRICALS LTD.,</b> <b>BOILER PLANT UNIT, TIRUCHIRAPALLI-620 014</b>									
05-228/B				SCALE	WEIGHT (KG)	REF. TO ASSY. DRG	IT NO.				
DEPT	CODE			N-T-S	1234.0	3-E23325 (481)					
TITLE						NAME	SIGN	DATE			
<b>BODY ASSY</b>  A 472 B - 35 H      (1472500 C)						DRAWN	EC02				
						CHECKED	MRC	M.L.	24/4/82		
						APPROVED	VB	hony	24/4/82		
DIMENSIONS TO BE CONTROLLED WITHIN LIMITS AS SHOWN. MACHINING TOLERANCE $\pm 0.25$ mm UNLESS OTHERWISE SHOWN NON-MACHINING TOLERANCE $\pm 0.5$					1	CARD CODE	REF. TABLE			15	REV. 12
						U01	2-V-0000-15173				03

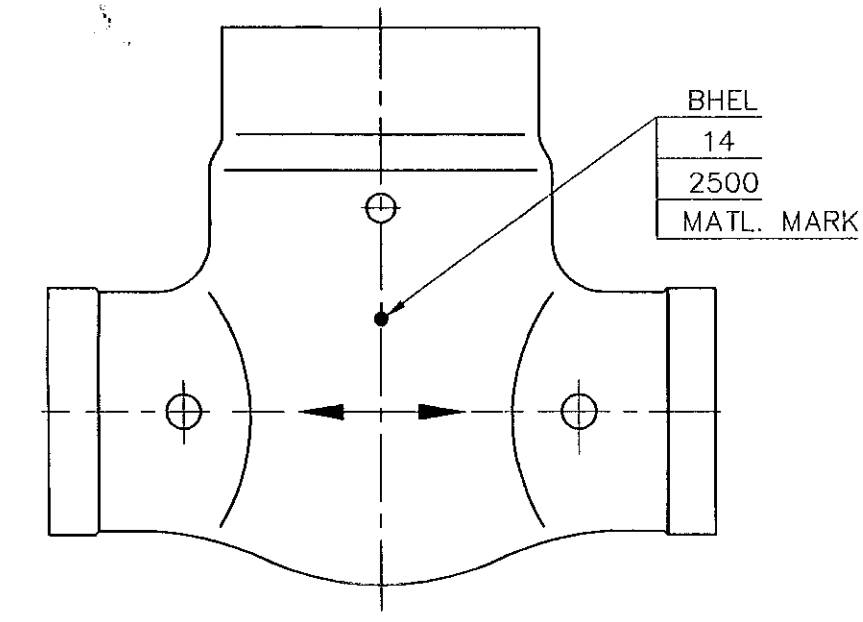
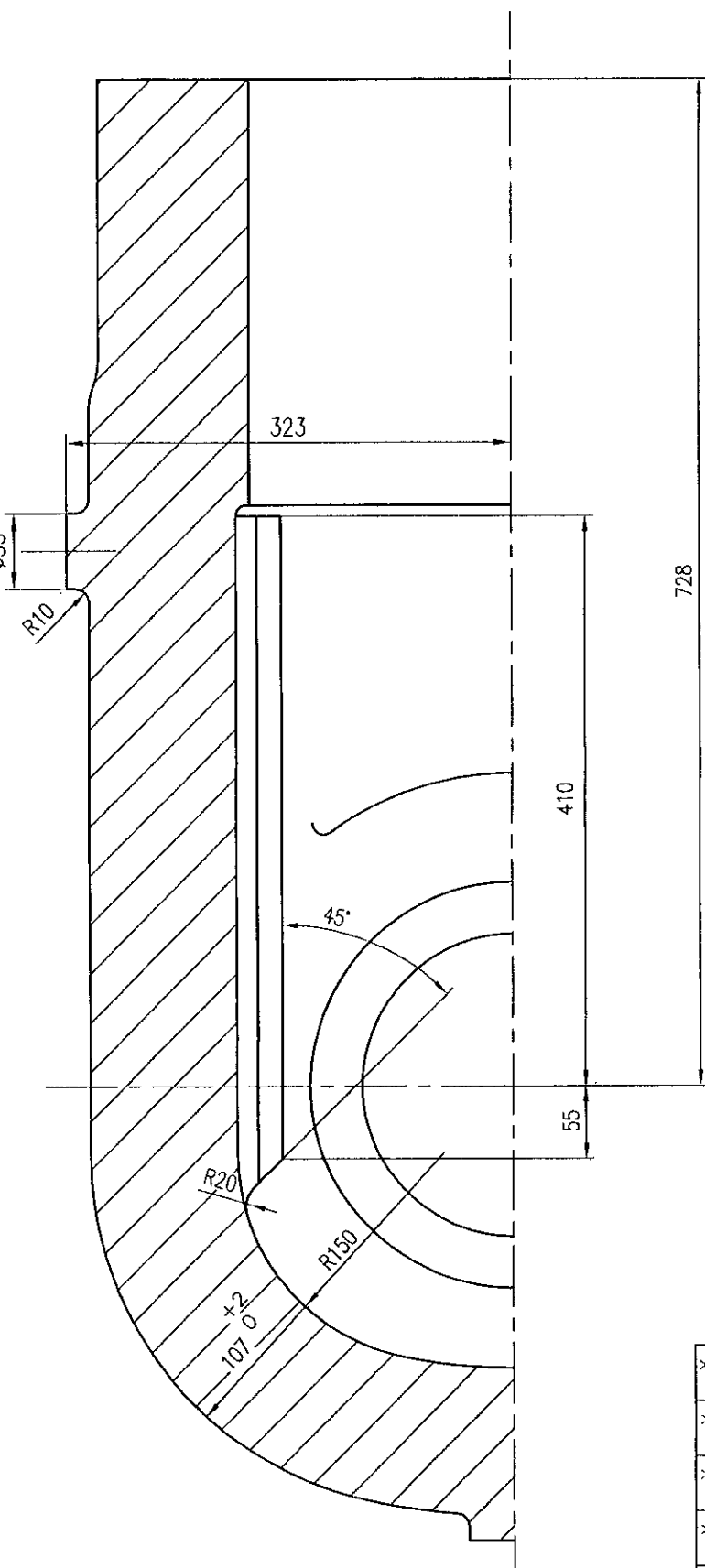
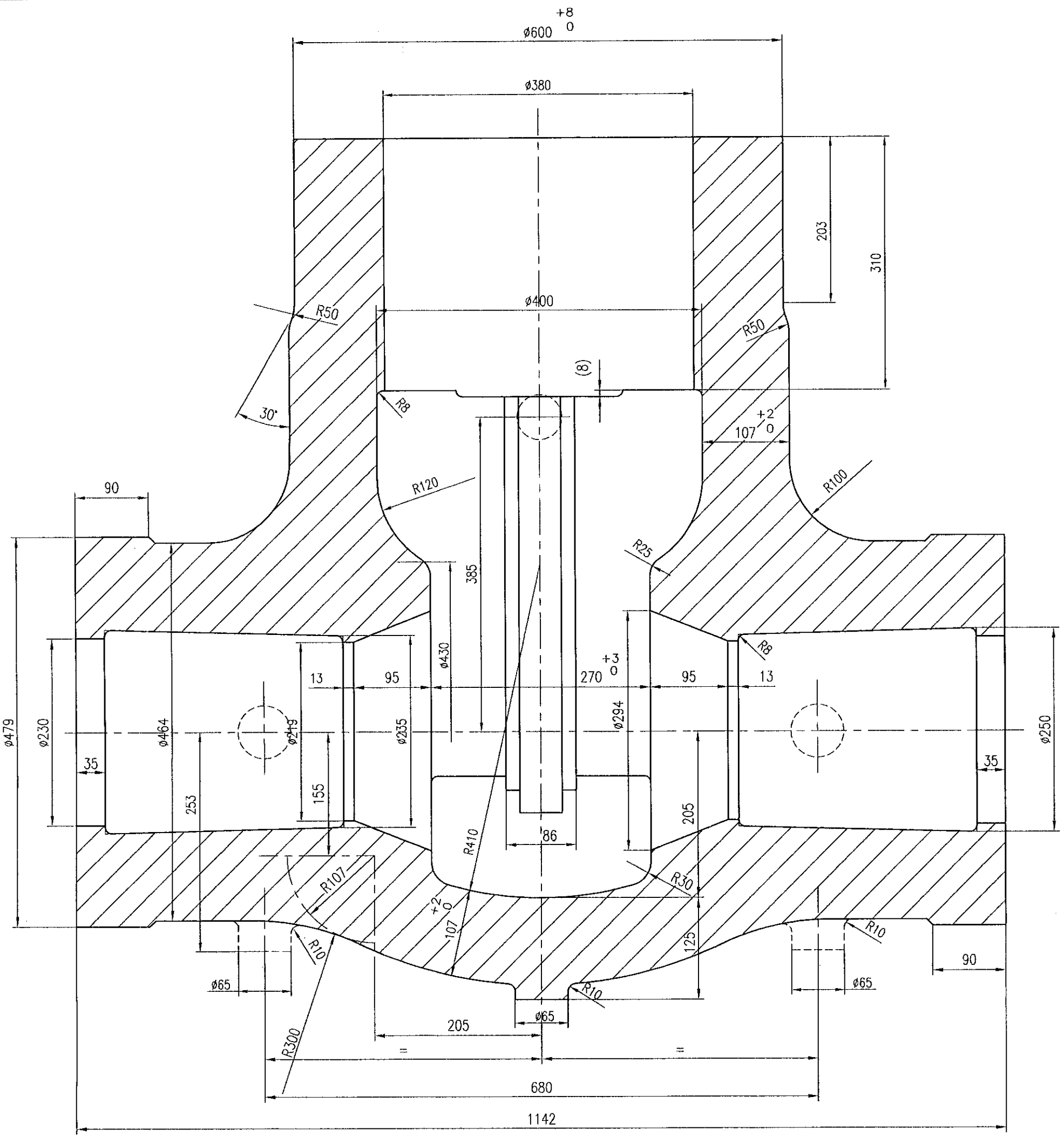
SIZE A2

DRAWING NO. 2-V-0000-16410R

ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP

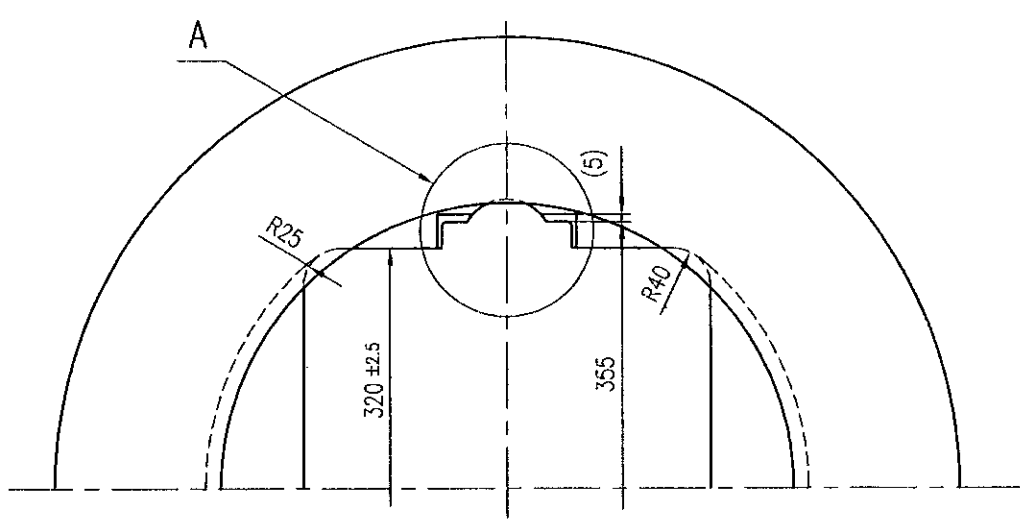
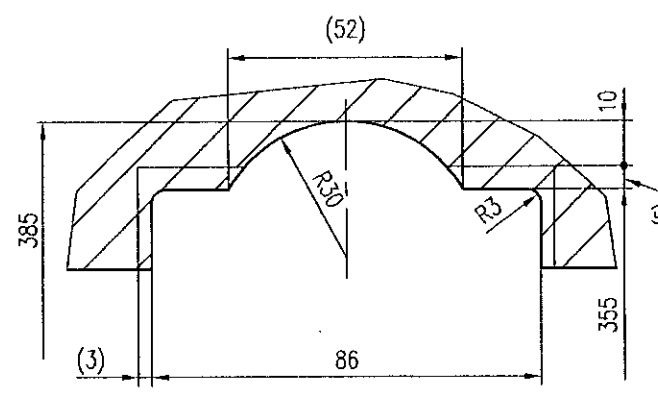
A  
B  
C  
D  
E  
F

A  
B  
C  
D  
E  
F



NOTES: -

- 1. FOR ALL OTHER DETAILS LIKE DIMENSIONAL TOLERANCE, EMBOSSING, ETC REFER LATEST APPLICABLE QUALITY WORK INSTRUCTIONS.
- 2. \*FOR THESE SPECIAL CLASS VALVE EMBOSSING SHALL BE '2500 SPL'
- 3. \*ALL THE SPECIAL CLASS CASTING ARE TO BE SUBJECTED RT/UT ON ALL CRITICAL LOCATIONS.
- 4. \*ALL EXTERIOR AND ACCESSIBLE INTERIOR SURFACES OF BODY SHALL BE MPI/LPI TESTED.
- 5. BY PASS VALVE PADDING SHALL BE PROVIDED ON BOTH SIDES OF THE BODY
- 6. PRESSURE RELIEVING PAD SHALL BE PROVIDED ON BOTH SIDES OF THE BODY

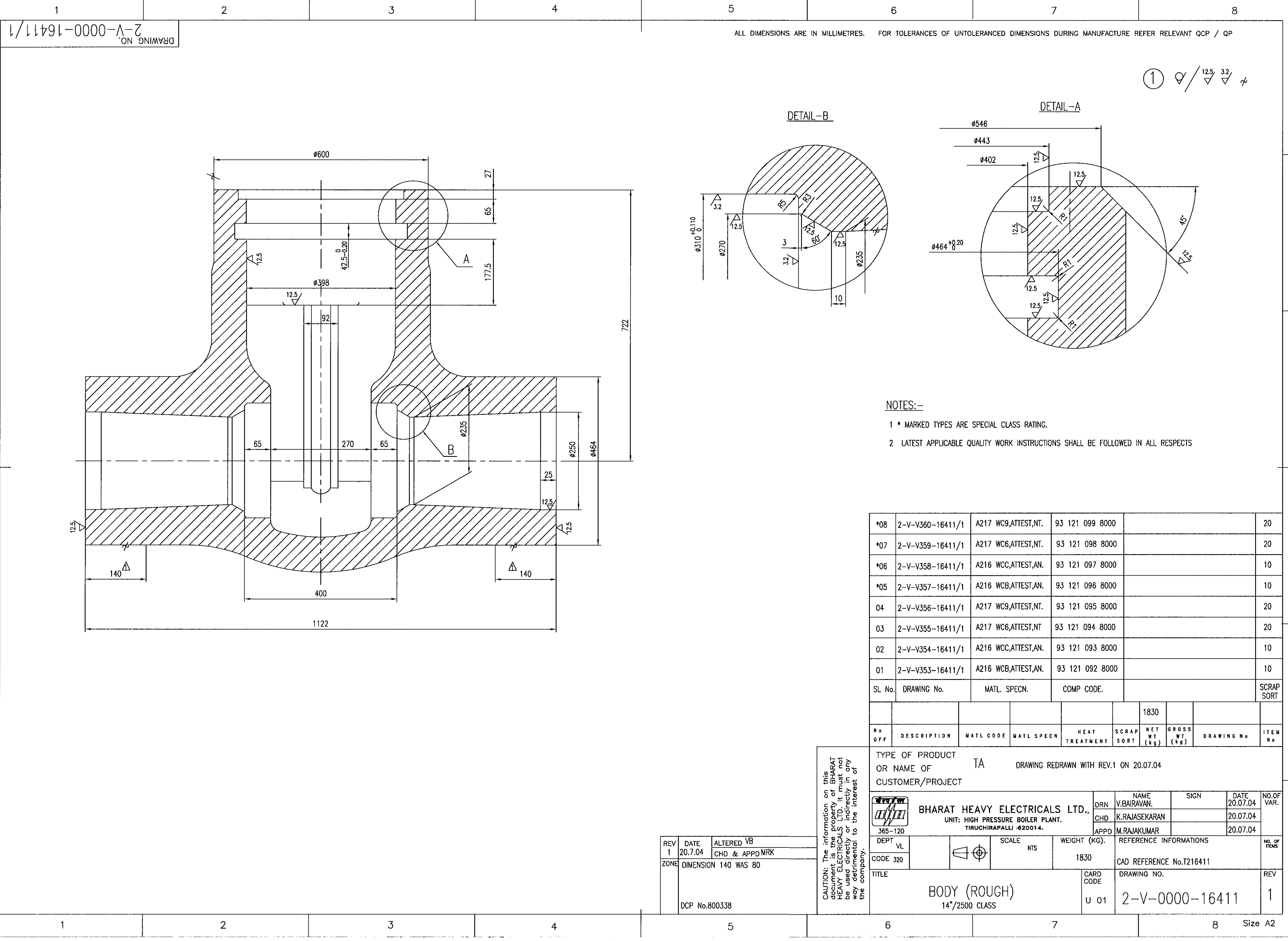


*08	2-V-V368-16410R	A217 WC9,NT, ATTEST	92 152 433 0000	WC9	
*07	2-V-V367-16410R	A217 WC6,NT, ATTEST	92 152 432 0000	WC6	
*06	2-V-V366-16410R	A216 WCC,AN, ATTEST	92 152 431 0000	WCC	
*05	2-V-V365-16410R	A216 WCB,AN, ATTEST	92 152 430 0000	WCB	
04	2-V-V364-16410R	A217 WC9,NT, ATTEST	92 152 429 0000	WC9	
03	2-V-V363-16410R	A217 WC6,NT, ATTEST	92 152 428 0000	WC6	
02	2-V-V362-16410R	A216 WCC,AN, ATTEST	92 152 427 0000	WCC	
01	2-V-V361-16410R	A216 WCB,AN, ATTEST	92 152 426 0000	WCB	
SL No.	DRAWING No.	MATERIAL SPECN.	MATERIAL CODE	MATL. MARK	

No OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
--------	-------------	-----------	------------	----------------	------------	-------------	---------------	------------	---------

REV		DATE	ALTERED
ZONE			CHD & APPD
CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.			
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT			
BHARAT HEAVY ELECTRICALS LTD. UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.			
DEPT V L		SCALE	WEIGHT (KG).
CODE 320		NTS	
TITLE		CAD REF:T216410R	NO. OF ITEMS
BODY		DRAWING NO.	REV
14"/2500CLASS		2-V-0000-16410R	0

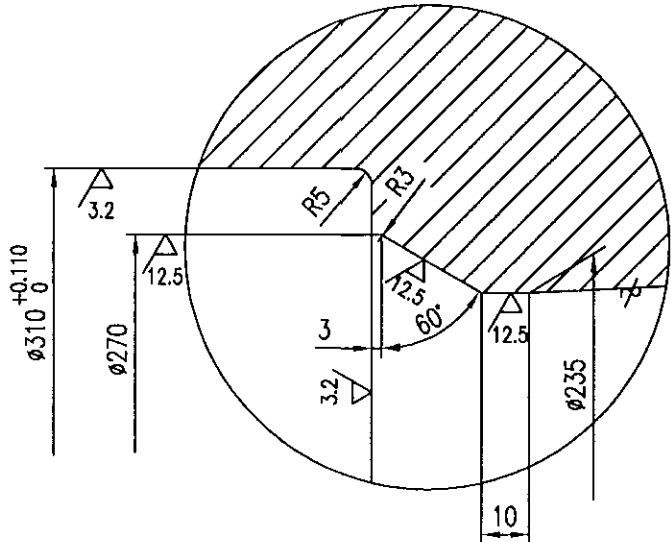




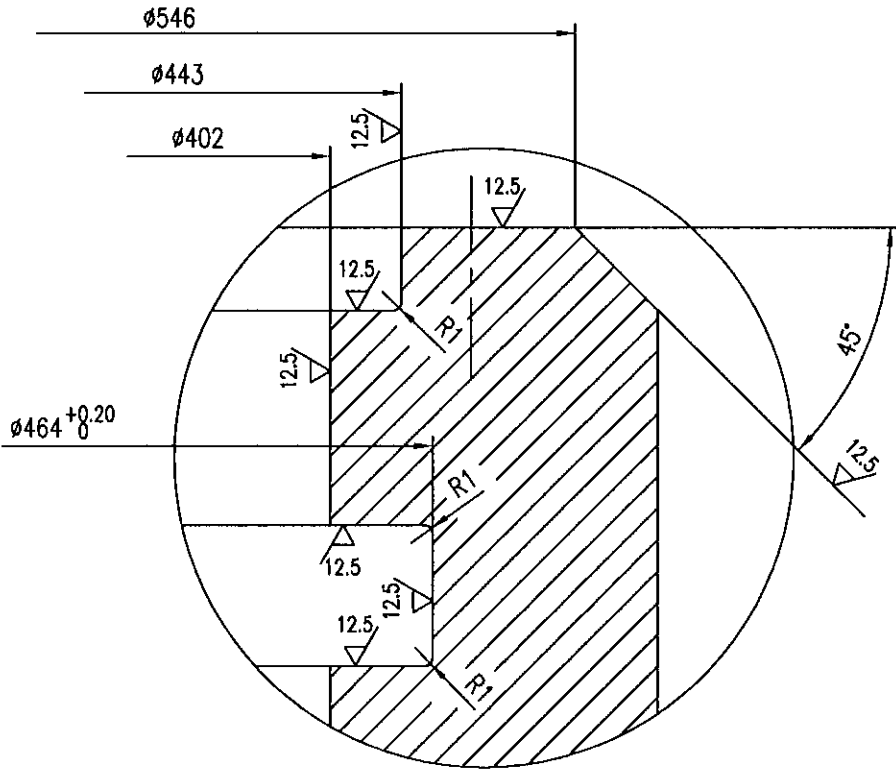
ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP

1  $\nabla$  /  $\nabla$  12.5 3.2  $\nabla$

DETAIL-B



DETAIL-A



NOTES:-

- 1 \* MARKED TYPES ARE SPECIAL CLASS RATING.
- 2 LATEST APPLICABLE QUALITY WORK INSTRUCTIONS SHALL BE FOLLOWED IN ALL RESPECTS

*08	2-V-V360-16411/1	A217 WC9,ATTEST,NT.	93 121 099 8000		20
*07	2-V-V359-16411/1	A217 WC6,ATTEST,NT.	93 121 098 8000		20
*06	2-V-V358-16411/1	A216 WCC,ATTEST,AN.	93 121 097 8000		10
*05	2-V-V357-16411/1	A216 WCB,ATTEST,AN.	93 121 096 8000		10
04	2-V-V356-16411/1	A217 WC9,ATTEST,NT.	93 121 095 8000		20
03	2-V-V355-16411/1	A217 WC6,ATTEST,NT	93 121 094 8000		20
02	2-V-V354-16411/1	A216 WCC,ATTEST,AN.	93 121 093 8000		10
01	2-V-V353-16411/1	A216 WCB,ATTEST,AN.	93 121 092 8000		10
SL No.	DRAWING No.	MATL. SPECN.	COMP CODE.		SCRAP SORT

						1830			
No OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT									
TA DRAWING REDRAWN WITH REV.1 ON 20.07.04									
BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI -620014.				DRN	V.BAIRAVAN.	SIGN	DATE	NO.OF VAR.	
				CHD	K.RAJASEKARAN		20.07.04		
				APPD	M.RAJAKUMAR		20.07.04		
DEPT VL		SCALE NTS	WEIGHT (KG).	REFERENCE INFORMATION					NO.OF ITEMS
CODE 320			1830	CAD REFERENCE No.T216411					
TITLE						CARD CODE	DRAWING NO.	REV	
BODY (ROUGH) 14"/2500 CLASS						U 01	2-V-0000-16411	1	

REV 1	DATE 20.7.04	ALTERED VB
ZONE		CHD & APPD MRK
	DIMENSION 140 WAS 80	
	DCP No.800338	

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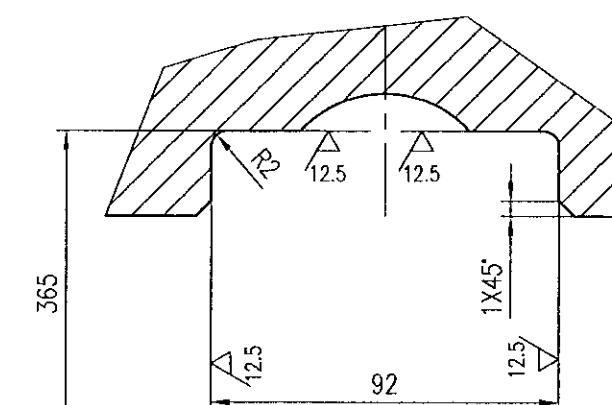
DRAWING NO. 2-V-0000-16411/1

DRAWING NO  
2-V-0000-16417

ALL DIMENSIONS ARE IN MILLIMETRES. FOR TOLERANCES OF UNTOLERANCED DIMENSIONS DURING MANUFACTURE REFER RELEVANT QCP / QP

①  $\nabla$  12.5  $\nabla$  3.2  $\nabla$  0.8

$\phi 400$ H7	+0.057 0
$\phi 445$ H7	+0.063 0



SECTION-AA

## NOTES:-

- \* MARKED TYPES ARE SPECIAL CLASS RATING.
- LATEST APPLICABLE QUALITYWORK INSTRUCTION SHALL BE FOLLOWED IN ALL RESPECTS
- EDGE PREPARATION SHALL BE AS PER SEPERATE INSTRUCTION.

08*	2-V-V360-16417	2-V-V360-16410R	A217 WC9,ATTEST,NT.	93 121 099 9000	E9018 B3	20
07*	2-V-V359-16417	2-V-V359-16410R	A217 WC6,ATTEST,NT.	93 121 098 9000	E8018 B2	20
06*	2-V-V358-16417	2-V-V358-16410R	A216 WCC,ATTEST,AN.	93 121 097 9000	E7018 I	10
05*	2-V-V357-16417	2-V-V357-16410R	A216 WCB,ATTEST,AN.	93 121 096 9000	E7018 I	10
04	2-V-V356-16417	2-V-V356-16410R	A217 WC9,ATTEST,NT.	93 121 095 9000	E9018 B3	20
03	2-V-V355-16417	2-V-V355-16410R	A217 WC6,ATTEST,NT.	93 121 094 9000	E8018 B2	20
02	2-V-V354-16417	2-V-V354-16410R	A216 WCC,ATTEST,AN.	93 121 093 9000	E7018 I	10
01	2-V-V353-16417	2-V-V353-16410R	A216 WCB,ATTEST,AN.	93 121 092 9000	E7018 I	10
SL No.	DRAWING No.	CASTING DRG. No.	MATL. SPECN.	COMP CODE.	ELECTRODE SPECN. (FOR PART No.91)	SCRAP SORT

No OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
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TYPE OF PRODUCT  
OR NAME OF  
CUSTOMER/PROJECT

DEPT	VL	SCALE	WEIGHT (KG).	REFERENCE INFORMATION	NO. OF ITEMS
CODE		N T S	1830	TOA DRAWING No. 3-035124 CAD REFERENCE No.T216417A	

TITLE	CARD CODE	DRAWING NO.	REV
BODY ASSY	U 01	2-V-0000-16417	0

14\*/2500 CLASS

U 01

2-V-0000-16417

0

REV	DATE	ALTERED
ZONE		CHD & APPD

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BODY  
(32"/150C)

2-V-0000-17337R 00

DEPT VL

DEPT	VL	GRADE OF UNTOL DIM
------	----	-----------------------

SCALE	WEIGHT (


REFERENCE INFORMATION	NO. OF ITEMS

NO OF VARS	DATE	SIGN	NAME	DRK	CHD
07.09.01	07.09.01	<i>[Signature]</i>	MP'S		
07.09.01	07.09.01	<i>[Signature]</i>	PRK		

BHARAT HEAVY ELECTRICALS LTD.,  
 UNIT: HIGH PRESSURE BOILER PLANT.  
 TIRUCHIRAPALLI-620014.

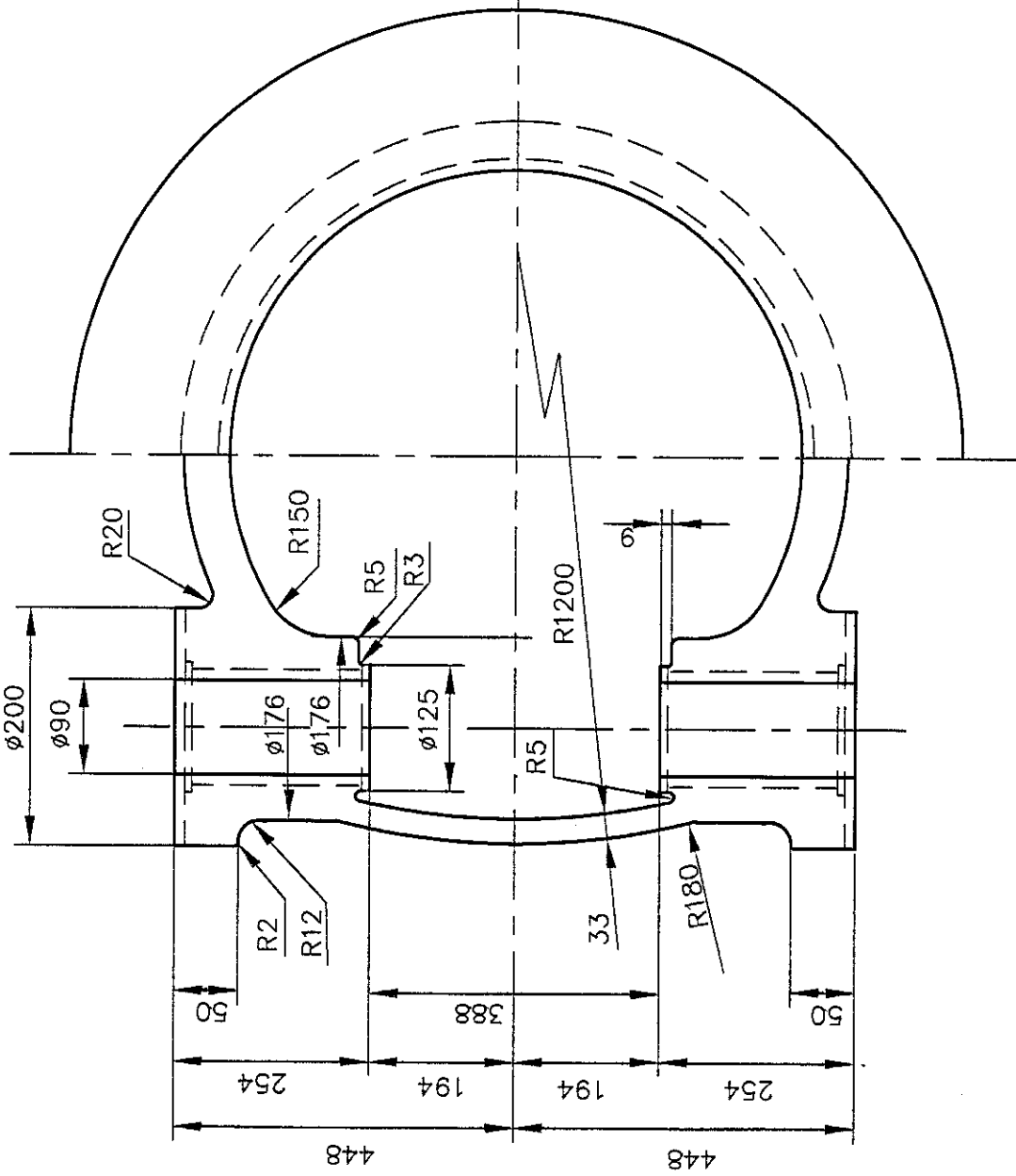
TYPE OF PRODUCT  
OR NAME OF  
CUSTOMER/PROJECT

100

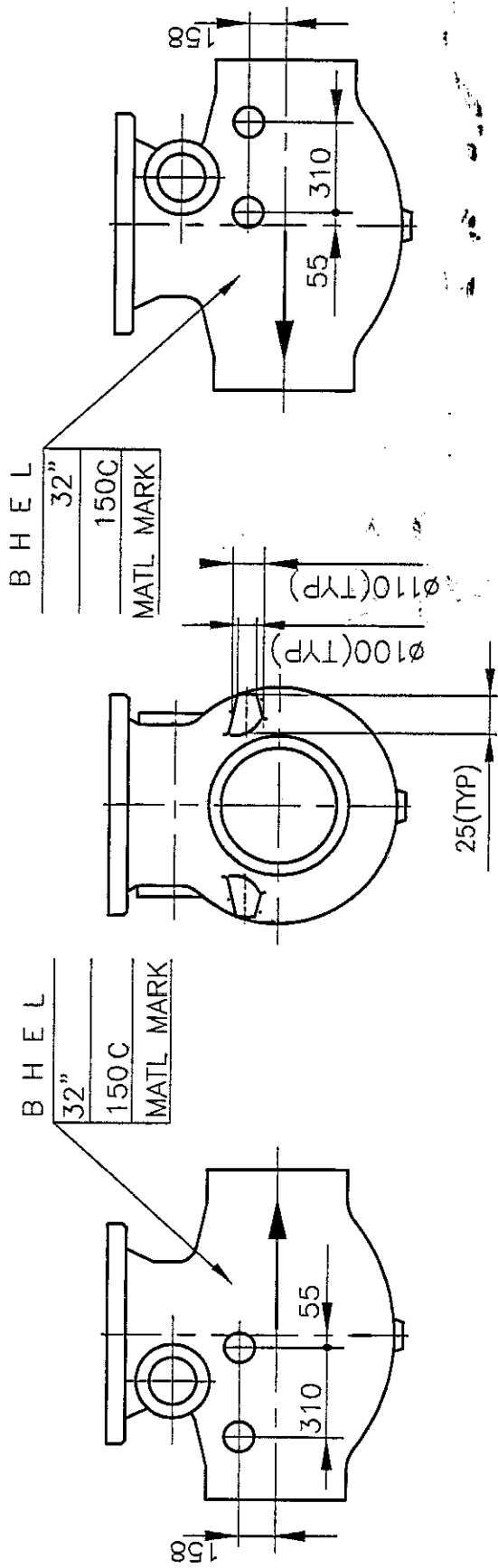


CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

1. CASTINGS ARE TO BE SUBJECTED TO RT/UT ON ALL CRITICAL LOCATIONS AS PER APPLICABLE LATEST QUALITY PROCEDURES
2. ALL EXTERIOR AND ACCESSIBLE INTERIOR SURFACES OF BODY SHALL BE MPI/LPI TESTED AS PER APPLICABLE LATEST QUALITY PROCEDURES.
3. DOTTED LINE SHOWS FINISH MACHINED CONFIGURATION.
4. FOR ALL OTHER DETAILS LIKE DIMENSIONAL TOLERANCE, EMBOSSING, PUNCHING DETAILS REFER APPLICABLE LATEST QUALITY PROCEDURES.
5. MATERIAL MARK SHOULD BE ON BOTH SIDES



BOSS LOCATION FIG

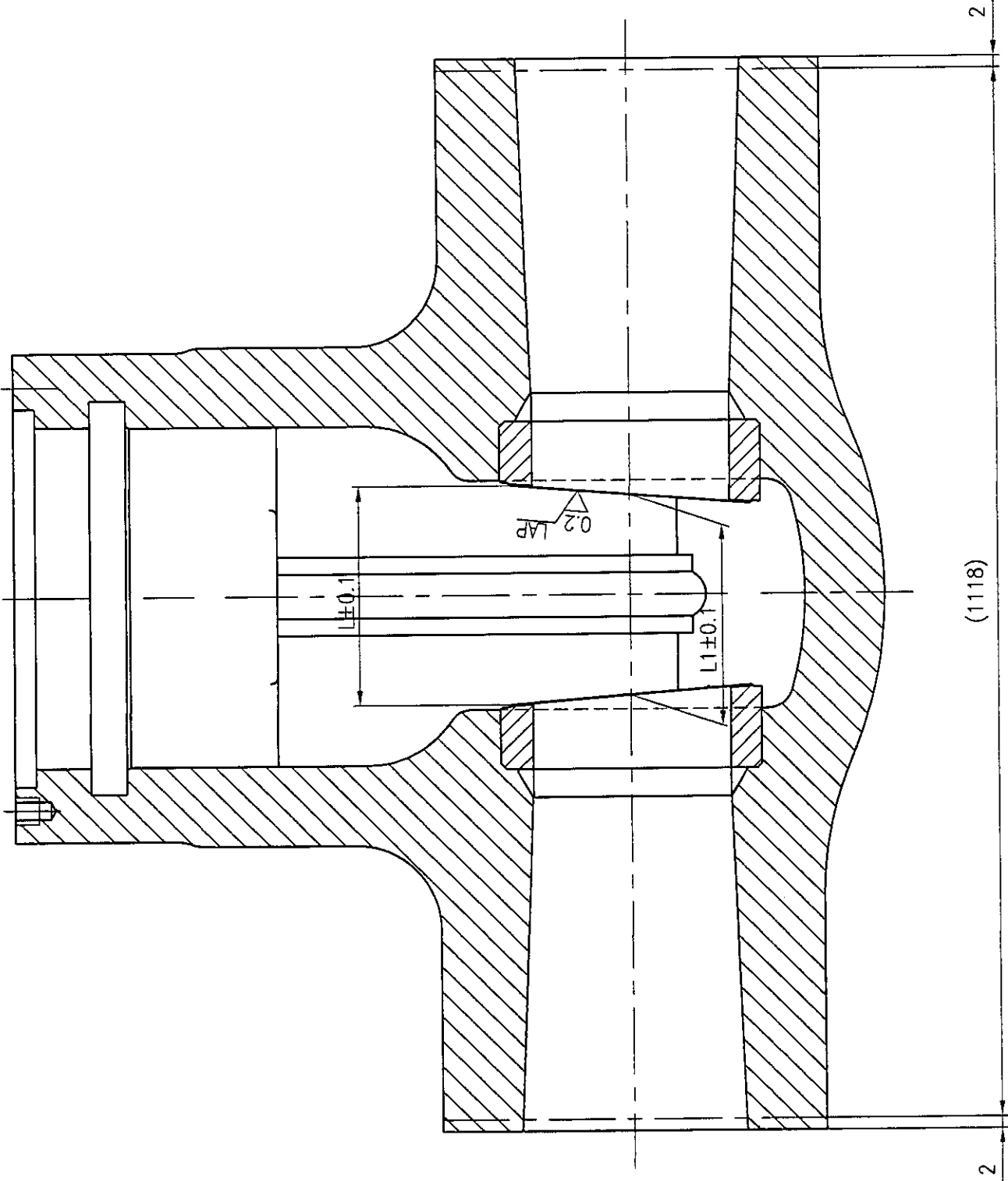








61512-0000-A-3  
DRAWING NO.



NOTE: \* MARKED TYPES ARE SPECIAL CLASS RATINGS.

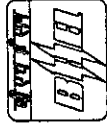
Q / 0.2 /

SL. NO.	DRAWING NUMBER	MATERIAL SPECN.	COMPONENT CODE	DIMENSIONS	
				L	L 1
01	3-V-V353-21319	A216-WCB,AN,ATTEST	93 121 092 0000	252.91	230.71
02	3-V-V354-21319	A216-WCC,AN,ATTEST	93 121 093 0000		
03	3-V-V355-21319	A217-WC6,NT,ATTEST	93 121 094 0000		
04	3-V-V356-21319	A217-WC9,NT,ATTEST	93 121 095 0000		
05*	3-V-V357-21319	A216-WCB,AN,ATTEST	93 121 096 0000		
06*	3-V-V358-21319	A216-WCC,AN,ATTEST	93 121 097 0000		
07*	3-V-V359-21319	A217-WC6,NT,ATTEST	93 121 098 0000		
08*	3-V-V360-21319	A217-WC9,NT,ATTEST	93 121 099 0000		
09	3-V-V361-21319	A216-WCB,AN,ATTEST	93 121 261 0000	252.20	230.0
10	3-V-V362-21319	A216-WCC,AN,ATTEST	93 121 262 0000		
11	3-V-V363-21319	A217-WC6,NT,ATTEST	93 121 263 0000		
12	3-V-V364-21319	A217-WC9,NT,ATTEST	93 121 264 0000		
13*	3-V-V365-21319	A216-WCB,AN,ATTEST	93 121 265 0000		
14*	3-V-V366-21319	A216-WCC,AN,ATTEST	93 121 266 0000		
15*	3-V-V367-21319	A217-WC6,NT,ATTEST	93 121 267 0000		
16*	3-V-V368-21319	A217-WC9,NT,ATTEST	93 121 268 0000		

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
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TYPE OF PRODUCT  
OR NAME OF  
CUSTOMER/PROJECT

TA



BHARAT HEAVY ELECTRICALS LTD.,  
UNIT: HIGH PRESSURE BOILER PLANT.  
TIRUCHIRAPALLI-620014.

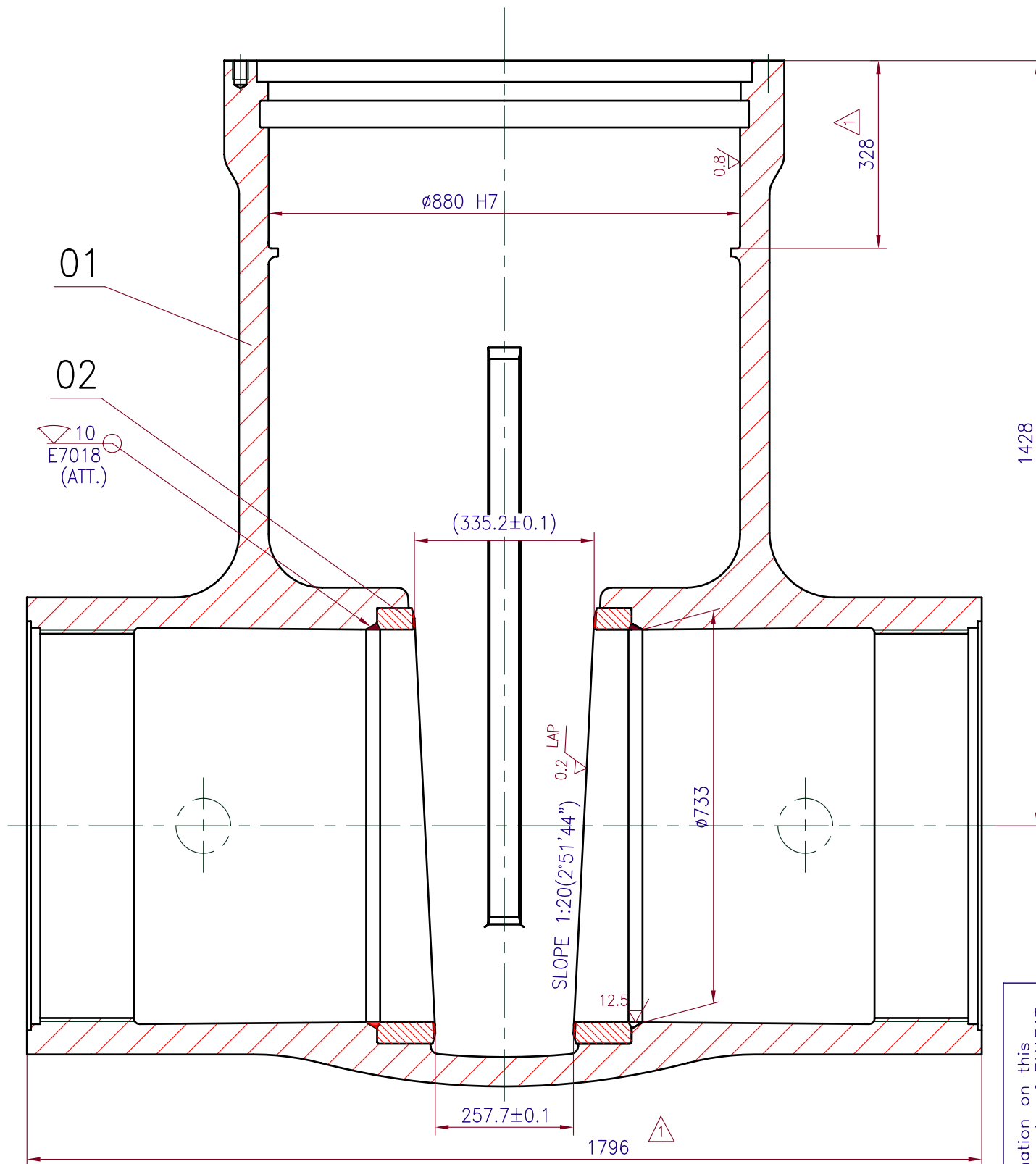
NAME	SIGN	DATE	NO. OF VAR.
V. BAIRAVAN	<i>[Signature]</i>	8/3/03	
K. RAJASEKARAN	<i>[Signature]</i>	8/3/03	
M. RAJAKUMAR	<i>[Signature]</i>	8/3/03	

DEPT	VL	SCALE	WEIGHT (KG)	REFERENCE INFORMATION	NO. OF ITEMS
CODE		N T S	1830	CAD REF:-T321319	

TITLE	CARD CODE	DRAWING NO.	REV
BODY ASSY 350mm/2500CLASS	U 01	3-V-0000-21319	0



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REV	DATE	ALTERED
		CHD & APPD



ø880-H7	+0.090
	0

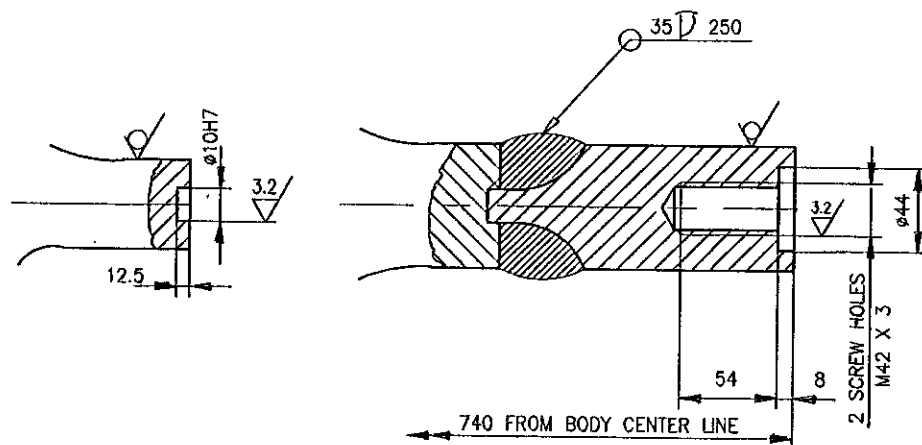
LATEST APPLICABLE QUALITY WORK INSTRUCTION SHALL BE FOLLOWED IN ALL RESPECTS.

01	3-V-NA06-23959/1	931108310000							
SL. No.	DRAWING No.	COMP. CODE							
NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT									
<div><div><div>365-121</div></div><div>BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.</div></div>					DRN	NAME V.BAIRAVAN	SIGN	DATE 17.03.04	NO.OF VAR.
					CHD	R.L.NARAYANAN		17.03.04	
					APPD	M.RAJAKUMAR		17.03.04	
DEPT VL			SCALE	WEIGHT (KG).	REFERENCE INFORMATIONS				NO. OF ITEMS
CODE 320			N T S	3932					
TITLE					CARD CODE	DRAWING NO.			REV
BODY ASSEMBLY 32"/600CLASS					U 01	3-V-0000-23959			1

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REV	DATE	ALTERED VB
1	9.5.05	CHD & APPD MRK
<p>DIMENSIONS 231 &amp; 356 DELETED.          DIMENSION 1796 WAS 1782          DIMENSION 328 INCLUDED.          DCP No.800449</p>		

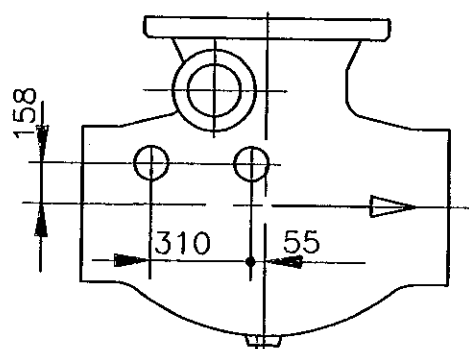
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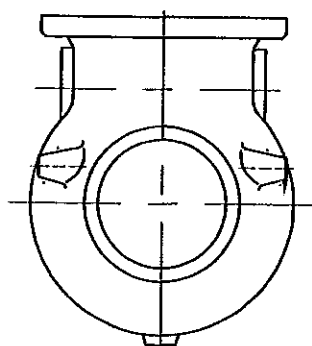
BEFORE WELDING

AFTER WELDING

BOSS WELDING DETAIL



STYLE-G

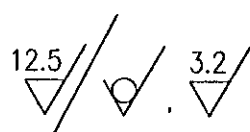


STYLE-H

BOSS LOCATION FIG

NOTE

1. LATEST APPLICABLE QUALITY PROCEDURE SHALL BE FOLLOWED IN ALL RESPECTS.
2. REFER CIS FOR APPLICABLE STYLE



REV	DATE	ALTERED
		CHD & APPD

CAUTION: The information on this document is the property of BHARAT HEAVY ELECTRICALS LTD. It must not be used directly or indirectly in any way detrimental to the interest of the company.

NO OFF	DESCRIPTION	MATL CODE	MATL SPECN	HEAT TREATMENT	SCRAP SORT	NET WT (kg)	GROSS WT (kg)	DRAWING No	ITEM No
TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT									
BHARAT HEAVY ELECTRICALS LTD., UNIT: HIGH PRESSURE BOILER PLANT. TIRUCHIRAPALLI-620014.				DRN	NAME MPS	SIGN	DATE	NO.OF VAR.	
365-121				CHD	PRK				
				APPD	SNR		250202		
DEPT VL		SCALE	WEIGHT (KG).	REFERENCE INFORMATION				NO. OF ITEMS	
CODE 320		N.T.S.							
TITLE				CARD CODE	DRAWING NO.				REV
BOSS ATTACHMENT DETAIL (32" / 150C)				U 01	3-V-L634-22743 00				