

BHARAT HEAVY ELECTRICALS LIMITED
HEEP: HARDWAR-249 403 (UA)
Fax: 01334-223948/226462, Phone: 285283
E-mail: danoop@bhelhwr.co.in

No. Turbine/OT/01

Date: 12th Sep.'06

Subject: Open tender as detailed below:

OPEN TENDER

1. Sealed tenders with the Tender No. and opening date clearly written on the cover are invited from the manufacturers/their authorized agents for the supply of the following items:-
2. Last date for taking tender documents and opening of tenders is indicated against each tender. Tenders will be received up to 1.45 P.M. on opening date and opened on the same day at 2.00 P.M. in the Tender Room.
3. Intending vendors must remit the tender fee of Rs. 2,000.00 for indigenous supplies (equivalent foreign currency \$ 50.00 / € 40.00) from foreign vendors against each tender along with the requisite EMD in the form of bank draft while submitting the tender documents as detailed in "Instruction to Bidders", after down loading from this web site.
4. BHEL will not be responsible for any type of postal delay / incomplete information from vendor.
5. Other terms and conditions will be as per tender documents.

Sl. No.	Tender No.	Description of Equipment	Qty. (Nos.)	Last date to get from BHEL	Opening date
1.	T/T213/6/3330N	I.P. Shaft (Machined) (as per enclosed specification)	02	09.10.06	10.10.06
2.	T/T213/6/3331N	L.P. Shaft (Machined) (as per enclosed specification)	02	09.10.06	10.10.06

(Anoop Deepak)
SDGM (Turbine Purchase)



BHARAT HEAVY ELECTRICALS LIMITED
HEEP HARIDWAR INDIA-PIN 249403
FAX NO: 0091 1334 226462/223948
PHONE NO: 0091 1334 285283

Enq. No.:

Date of issue: 12th Sep.'06

Due Date:

M/S.....

.....

Sub: Tender Enquiry No.-----

Dear Sir,

We are pleased to invite your offer in TWO PARTS.
Strictly as per enclosed terms and conditions and instruction to bidders, in sealed covers for the under mentioned equipment/systems.

S.N.	Description	Qty. (Nos.)	Delivery Required	EMD (Earnest Money Deposit)
1.	I.P. Shaft (Machined) as per enclosed Specifications	01 01	01.05.07 01.07.07	Rs. 1,00,000.00/- (Rs. one lac only or equivalent foreign currency)
2.	L.P. Shaft (Machined) as per enclosed Specification	01 01	01.03.07 01.05.07	Rs. 1,00,000.00/- (Rs. one lac only or equivalent foreign currency)

Please submit your lowest quotation / offer for the above requirement subject to our terms and conditions.
Your offer should reach us on or before the due date by 1.45 PM.

**NOTE: The vendor should submit their best price at this stage it self and they will not be allowed to revise the price.
Any revision / discount given by vendor subsequently will be ignored & the bid is likely to be rejected.**

Part-1 bids shall be opened of those vendors **ONLY AFTER ENSURING PROOF OF EMD AND TENDER FEE (PLEASE SUBMIT SEPARATE DRAFTS FOR EMD AND TENDER FEE {drawn in favour of BHEL Hardwar} IN ANOTHER ENVELOPE SUPERSCRIBED WITH BOLD LETTERS "EMD & TENDER FEE")** at 2 PM on the due date in the presence of authorized representatives of the bidders who may like to be present. The authorized representative should bring authority letter from their principals (if any) for attending the bid opening. All Govt. of India / PSU / State Govt. entities are exempted from submission of EMD. Purchase preference will be given to CPSE s as per GOI notification no. DPE/13(12) 2003-Fin. Dated 26th Oct'04.

Thanking You,
Yours Faithfully,
For & ON BEHALF OF BHEL, HARDWAR

(Anoop Deepak)
SDGM (Turbine Purchase)

INSTRUCTIONS TO BIDDERS FOR OPEN TENDER

Only those bids will be opened which has been submitted with requisite EMD & tender fee.

1. The tenders shall be submitted in two parts (part I Techno -Commercial Bid & vendor registration form & part II price Bid) as described below on or before the due date.
 - **The Quotation should be from the Principal / Original Manufacturer, failing which the quotation is likely to be ignored.**
 - Any corrections / amendments shall be properly & fully authenticated with signature.
- 1.1 PART-I (TECHNO-COMMERCIAL BID) shall comprise of following documents:
 - a) Complete technical offer as per specification, scope of work & Dwrgs. technical requirement as per Annexure-I, II & III enclosed herewith.
 - b) Acceptance of terms & conditions for two part bid as per Annexure-IV.
 - c) Deviation with reference to specification to be laid down on separate sheet.
 - d) Un priced copy of offer. (price bid)
 - e) Please inform whether machining shall be carried out in house or out side. In case machining is done outside, give details of machining sub vendors also.
 - f) Those vendors who are not registered with us shall submit vendor evaluation registration form which can be down loaded from our website www.bhel.com .
 - g) Terms of payment: 100% through irrevocable LC against despatch. Please confirm the same.

Part-II Price bid:

Price bid with prices to be submitted as part –II of the tender.

1.3.1 The following shall be subscribed on the envelopes:

1. EMD AND TENDER FEE. : Details of Drafts attached (No, Bank, Branch, Issue date) should be submitted along with the part-I in separate envelope tender no. & due date clearly mentioned on the envelope along with details of EMD & Tender Fee.
2. PART-I
 1. TENDER NO. AND ITEMS DESCRIPTION.
 2. DUE DATE FOR OPENING.
 3. "TECHNO-COMMERCIAL BID PART-I"
 4. Those vendor who are not registered with us shall submit vendor registration form which can be down loaded from our website www.bhel.com and should be submitted in hard copy along with part-I of tender.
3. PART-II
 1. TENDER NO. AND ITEMS DESCRIPTION.
 2. DUE DATE FOR OPENING OF PART-I.
 3. "PRICE BID PART-II".

1.3.2 Envelopes not marked as above are liable to be ignored and will not be opened.

IN CASE YOU ARE NOT MAKING AN OFFER AGAINST THIS ENQUIRY, THEN PLEASE ARRANGE TO SEND A LETTER OF REGRET IF YOU HAVE COLLECTED THE TENDER DOCUMENTS FROM BHEL.

Thanking You,

Yours faithfully,
For & on behalf of BHEL, Hardwar.

(Anoop Deepak)
SDGM (Turbine Purchase)

- | | | |
|----|--|--------------|
| 1. | Specificaliton | Annexure-I |
| 2. | Scope of work | Annexure-II |
| 3. | Dwrqs. | Annexure-III |
| 4. | Terms & Conditions for
two part bid enquiry | Annexure-IV |

ANNEXURE-IV**TERMS AND CONDITION FOR TWO PART TENDER**

INQUIRY No..

PLEASE FILL THIS ANNEXURE & ATTATCH WITH YOUR TECHNO-COMMERCIAL BID.

Offer must be sent in two separate sealed envelopes containing Techno-commercial offer in one envelope marked “ **TECHNO-COMMERCIAL BID**” and the prices in the second envelope marked “ **PRICED- BID**”. Both the envelopes must be contained in the main envelope. Tender name and due date to be marked on all the envelopes.

You are requested to kindly confirm/ clarify the following:-

SI No.	Description	Your confirmation
1.	Validity: Confirm that validity of the offer shall be 120 days from the due date.	
2.	Confirm that unpriced part bid is enclosed with technical/commercial offer.	
3.	Confirm that the prices has been quoted on FOB as well as C&F Basis.	
4.	Confirm that the prices have been quoted on F.O.R as well as EX-works basis.	
5.	Confirm that the prices shall be firm and fixed.	
6.	Confirm that bank Charges shall be either side.	
7.	Liquidated damages:- at the rate of ½ %(half percent) per week or part thereof subject to a maximum of 10% of the value of unexpected portion of the order.	
8.	Drawings/ Date sheets as called for in the spec shall be submitted for approval to BHEL for BHEL/ customer approval within 15 days of purchase order. Any delay in delivery on account of late submission of drawings shall be to vendors account.	
9.	Confirm that all the test certificates shall be submitted in 3 Hard copies and 3 CD ROM's	
10.	Right of Acceptance-BHEL reserves the right to reject any or all the quotations without assigning any reasons thereof. BHEL also reserves the right to Increase and Decrease the tendered quantities. Vendors should be prepared to accept order for reduced Quantity without any extra charges. Vendors should also be prepared for giving discount in case of Increase in Quantity.	
11.	Guarantee Certificate shall be provided as per BHEL Spec.	
12.	Confirm specifically that the material shall be supplied as per tender documents.	
13.	If there any deviation with respect to the tender documents then the same should be bought out specifically in separate annexure marked deviations (Technical/Commercial).	
14.	Furnish the Organization chart for the information.	
15.	Ink signed order acceptance shall be furnished within 15 days of order placement.	
16.	Confirm that there is Indian agency commission.	



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

HW19371 ANN-I.pdf


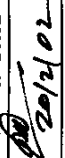




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दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)	HW19371 मुखपृष्ठ PREFACE SHEET
सामग्री सूची संख्या को अधिकृत करता है। SUPERSEDES INVENTORY NO.	केवल आंतरिक प्रयोग हेतु प्रदायक को देने से पूर्व इस मुखपृष्ठ को निकाल दें। FOR INTERNAL USE ONLY REMOVE THIS PREFACE BEFORE ISSUE TO SUPPLIERS.		
COPYRIGHT AND CONFIDENTIAL <small>The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.</small>	समतुल्य मानक/सूची आदि COMPARABLE STANDARDS / CATALOGUES ETC. } : NIL सुझाए/सम्भावित प्रदायक एवं श्रेणी SUGGESTED / PROBABLE SUPPLIERS AND GRADES } : कोई अन्य जानकारी ANY OTHER INFORMATIONS } : Based on TLV 9190/01/Feb 1998		
स्वत्वाधिकार एवं गोपनीय <small>इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रयोग एवं प्रसारण इस सूचना के बिना या इस सूचना के बिना किसी भी प्रकार प्रयोग को कि कंपनी के हित में हानिकारक हो न किया जाए।</small>	हस्ताक्षर एवं दिनांक SIGN & DATE 		
सामग्री सूची संख्या INVENTORY NO. P. 2337	REV. NO. 02 06.08.04		स्वीकृति : संस्थान मानक समिति APPROVED: PLANT STANDARDS COMMITTEE निर्माण : PREPARED: MTE जारी : मानक विभाग ISSUED: STANDARDS DIVISION दिनांक : DATE : 18.02.2002

दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हर्द्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)	HW19371 पृष्ठ का Page 1 of 6																								
सामग्री सूची संख्या INVENTORY NO.	IP ROTOR SHAFT FORGING WITH DIAMETRE \leq 1400MM IN MATERIAL GRADE: 30CrMoNiV 5 11																										
BASED ON TLV 9190-01 Feb 1998																											
1.0 GENERAL: This specification governs the quality of Intermediate Pressure (IP) rotor shaft forging of steel grade 30CrMoNiV 5 11 for steam turbine.																											
2.0 APPLICATION: For forging of IP rotor shaft forging with diameter \leq 1400 mm, for steam turbine.																											
3.0 CONDITION OF DELIVERY: Heat-treated and machined condition as per the ordering drawing.																											
4.0 DIMENSION AND TOLERANCES: Forging shall be supplied to the dimensions and tolerances as per the ordering drawing.																											
5.0 MANUFACTURING: 5.1 GENERAL REQUIREMENTS: Before starting the production the manufacturer shall submit following documents for BHEL approval, in accordance to the specification HW 0980816 of BHEL or QS0001 of Siemens: <ul style="list-style-type: none"> Manufacturing and inspection sequencing plan (MIP) for forging. MIP shall constitute details of: <ul style="list-style-type: none"> Steel melting, Steel treatment, Ingot pouring Forging process Preliminary Heat-treatment 																											
हस्ताक्षर एवं दिनांक SIGN & DATE	सामग्री सूची संख्या INVENTORY NO.	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;">Member (PSC) Csmv SubCom (I)</td> <td style="width:20%;">V. B. ARORA</td> <td style="width:20%;">18.2.02</td> <td style="width:45%;"></td> </tr> <tr> <td>TSX</td> <td>L. B. MALHOTRA</td> <td>18.2.02</td> <td>अनुवादक TRANSLATED BY</td> </tr> <tr> <td>QAX</td> <td>N. K. Manwani</td> <td>18.2.02</td> <td>निर्माणकर्ता WORKED BY</td> </tr> <tr> <td>STE</td> <td>A. K. JAIN</td> <td>18.08.02.2002</td> <td>जांचकर्ता CHECKED BY</td> </tr> <tr> <td>सहमत विभाग AGREED DEPTT.</td> <td>नाम NAME</td> <td>दिनांक एवं हस्ताक्षर DATE & SIGNATURE</td> <td>पर्यवेक्षणकर्ता SUPERVISED BY</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>		Member (PSC) Csmv SubCom (I)	V. B. ARORA	18.2.02		TSX	L. B. MALHOTRA	18.2.02	अनुवादक TRANSLATED BY	QAX	N. K. Manwani	18.2.02	निर्माणकर्ता WORKED BY	STE	A. K. JAIN	18.08.02.2002	जांचकर्ता CHECKED BY	सहमत विभाग AGREED DEPTT.	नाम NAME	दिनांक एवं हस्ताक्षर DATE & SIGNATURE	पर्यवेक्षणकर्ता SUPERVISED BY				
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स्वत्वधिकार एवं गोपनीय Copyright and Confidential The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.		स्वीकृति : संस्थान मानक समिति APPROVED : PLANT STANDARDS COMMITTEE																									
हस्ताक्षर एवं दिनांक SIGN & DATE		सामग्री सूची संख्या INVENTORY NO.																									
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दिनांक एवं हस्ताक्षर SIGN & DATE			संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)		HW 19371 पृष्ठ का Page 2 of 6		
सामग्री सूची संख्या को अधिकृत करता है ।	SUPERSEDES INVENTORY NO.	<ul style="list-style-type: none"> • Internal tests and inspections before Quality Heat-treatment • Quality Heat-treatment • Tests and Inspections after Heat-treatment • Heat Stability Test • Test certificate requirements • Marking, preservation and dispatch • Test instructions for NDE examinations in detail preferably with sketches. 					
COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company		<p>5.2 MELTING AND FORGING:</p> <p>Vacuum degassed steel with low silicon content (e.g. VCD steel) or Electric slag re-melted steel shall be used and shall be thoroughly forged. The use of any other melting method and secondary steel treatment shall be agreed upon in advance with the purchaser in each individual case.</p> <p>Before heat-treatment clocking symbols 3-6-9-12 shall be stamped on the end of the rotor. While transferring the symbols during manufacturing, they shall be restamped in the same clock position. The clocking symbol shall be used for reference purpose in recording the position of the defect, bore eccentricity etc.</p> <p>5.3 HEAT TREATMENT:</p> <p>The rotor shaft forging shall be subjected to a vertical liquid quenching (immersion in oil or water spraying). When using water spraying the cooling intensity shall be equivalent to the immersion in oil. Tempering shall also be performed vertically. The heat-treatment shall be carried out uniformly through out the cross section to obtain a homogeneous upper bainitic structure free of ferrite in the center. The hardening temperature shall lie between 940 °c and 960 °c. The tempering temperature shall be selected to achieve the prescribed 0.2 yield strength at the best possible toughness. It shall lie between 690°c and 710°c .</p> <p>The duration of tempering as well as the controlled cooling rate shall be such as to achieve minimum residual stresses. The residual stresses shall not exceed 60 N/mm² at any point on the surface. The residual stresses shall be measured by KWU-Ring Core method. The location of residual stress measurement shall be done as per specification HW 0850397.</p>					
हस्ताक्षर एवं दिनांक SIGN & DATE	10/20/02						
सामग्री सूची संख्या INVENTORY NO.	P-2337	REV. NO. 02		निर्माणकर्ता Worked by	AKSARKAR		8.2.02
				जांचकर्ता Checked by	J.P.MEENA		18/2/02

दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)		HW 19371
				पृष्ठ का Page 3 of 6
सामग्री सूची संख्या को अधिकृत किया गया है। INVENTORY NO.	6.0 PROPERTIES AND TESTS:			
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company	6.1 CHEMICAL COMPOSITION IN %:			
	Heat Analysis:			
	C 0.27 - 0.31 Si 0.10 MAX Mn 0.30 - 0.80 P 0.007 MAX S 0.007 MAX Cr 1.10 - 1.40 Mo 1.00 - 1.20 Ni 0.50 - 0.75 V 0.25 - 0.35 Al 0.010 MAX			
	The percentage of the tramp elements Cu, As, Sb and Sn shall be recorded in the test certificate for BHEL's information. Slight deviations in chemical composition are permissible after agreement with BHEL, provided service properties are not affected.			
स्वत्वाधिकार एवं गोपनीय इस प्रलेख में दी गई सूचना भारत हेवी इलेक्ट्रिकल्स की संपत्ति है। इसका प्रयोग एवं आश्रय के बिना किसी भी तरह प्रयोग, जो कि कंपनी के हित में प्रतिकारक हो न किया जाए।	6.2 MECHANICAL PROPERTIES			
	6.2.1 Tangential or Radial Specimens:			
	The manufacturer shall test Tangential or radial test specimens taken from locations indicated on the drawing. The test rings shall not be cut free before quality heat treatment. The location of tensile and impact specimens (distance from the heat-treatment surface) shall be in a distance of 40mm from the heat-treated surfaces and shall be indicated in the drawing. The following properties shall be achieved at room temperature:			
	0.2% Yield strength: 550 - 700 N/mm ² Tensile strength: 850 N/mm ² max % Elongation(lo = 5d) 15% min. % Reduction in Area 40 % min. Impact Strength 24 J min. (Average of 3 Charpy V-notch specimens)			
	6.2.2 Axial Core:			
	An axial core diameter ≥ 60 mm is to be taken out from the journal area of the shaft. The location of the axial core is shown in the order drawing. Apart from the data on the drawing, the position of the shaft in the forged ingot			
सामग्री सूची संख्या INVENTORY NO. P-2337	हस्ताक्षर एवं दिनांक SIGN & DATE 	REV. NO. 02	निर्माणकर्ता Worked by ARSARKAR	8.2.02
			जांचकर्ता Checked by JPMEENA	

दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हरिद्वार) PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)	HW 19371								
			पृष्ठ का Page 5 of 6								
सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.	<p>6.3.1.2 Magnetic Particle inspection:</p> <p>Magnetic particle inspection of the axial bore and of any radial bore, if any, shall be carried out. Magnetic particle inspection findings shall be evaluated in individual case.</p> <p>6.4 HEAT STABILITY TEST:</p> <p>During service a stable running of the shaft is required at quick starting up operations to service temperature as well as temperature fluctuations. The heat stability test shall be carried out at 30 C (appx) below tempering temperature according to test specification HW 0850197 / TWP M-151. Occurrence of A and D type deflections can be ignored if it can be proved that they are caused by surface influences. If B type deflections occur, the shaft shall be heated up and down as long as no further stresses are released. C type deflections τ 0.05 mm are not acceptable. BHEL reserves the right to repeat the heat stability test.</p> <p>7.0 MARKING:</p> <p>The supplier shall mark each shaft with the identification number. This is to be punched on the front face of the shaft end (coupling), at reference point 12 and is to be bordered with oil paint. This shall be confirmed by the authorised work inspector's stamp next to the identification number.</p> <p>8.0 DOCUMENTATION:</p> <p>The supplier shall furnish 4 copies of test certificates in accordance to EN10204B, unless and otherwise stated on the order. The test certificates shall bear the following information:</p> <p>BHEL Reference:</p> <ul style="list-style-type: none"> a) Identification number b) Purchase Order No. c) Drawing number d) Specification number <p>Supplier's Reference:</p> <ul style="list-style-type: none"> a) Name of supplier b) Material Identification c) Melt Number & melting process 									
सामग्री सूची संख्या INVENTORY NO.	हस्ताक्षर एवं दिनांक SIGN & DATE	Rev. 02	<table border="1"> <tr> <td>निर्माणकर्ता Worked by</td> <td>ASHISH</td> <td>Arayan</td> <td>5.8.04</td> </tr> <tr> <td>जांचकर्ता Checked by</td> <td>J.P. MEENA</td> <td>gagan</td> <td>5.8.04</td> </tr> </table>	निर्माणकर्ता Worked by	ASHISH	Arayan	5.8.04	जांचकर्ता Checked by	J.P. MEENA	gagan	5.8.04
निर्माणकर्ता Worked by	ASHISH	Arayan	5.8.04								
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दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हार्डवार) PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)		HW 19371 पृष्ठ का Page 6 of 6	
सामग्री सूची संख्या INVENTORY NO.	SUPERSEDES INVENTORY NO.	d) Details of steel ingot & forging process: Dimension, ingot weight, forging process and degree of forging ratio (Fmax/Fend at the largest diameter) e) Details of heat treatment ^{e.g.} method of cooling, actual time and temperature sequence, soaking time, Heating and cooling rate			
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		9.0 CLEARANCE FOR DELIVERY : The entire results of test performed are deciding factors for the clearance of the delivery. BHEL shall evaluate the total results with respect to intended operational requirements for the forging and judge accordingly the permissibility of deviations (if any) of the properties of the item required. The clearance does not relieve the manufacturer from the responsibility for hidden impermissible defects, which may be found later on.			
		10.0 DEVIATIONS : Deviations from this Purchase Specification, which arise during manufacturing, may be submitted to BHEL in writing, giving full details of the deviation. Acceptance of concession request will be at the sole discretion of BHEL.			
		11.0 PACKING & DISPATCH: Before dispatch, the forging shall be suitably packed to prevent corrosion and damage during transit. Steady rest portions shall be properly protected with anticorrosive compound. The axial and/or radial bores shall be plugged by BHEL as per the ordering drawing requirement of BHEL.			
हस्ताक्षर एवं दिनांक SIGN & DATE	P.2337	12.0 CROSS REFERRED STANDARDS: HW0980816, HW0850197, HW0850395, HW0850397, PA 14/24.51, TWP-M-151, EN10204.			
सामग्री सूची संख्या INVENTORY NO.	REV. NO. 02		निर्माणकर्ता Worked by	AKSARKAR	8.2.02
			जांचकर्ता Checked by	JPMENA	18/2/02

दिनांक एवं हस्ताक्षर SIGN & DATE		संस्थान क्रय विनिर्देश (हीप - हरिद्वार)	HW 19371
		PLANT PURCHASE SPECIFICATION (HEEP - HARDWAR)	पृष्ठ का Page 4 of 6

सामग्री सूची संख्या को अधिकृतित करता है । SUPERSEDES INVENTORY NO.	<p>shall be such that the axial core lies on the top side. Release for boring will be authorised by BHEL after review of the test results, including UT and residual stress values, submitted by the manufacturer.</p> <p>Axial trepanned core shall be tested in accordance with the plant standard HW0850395.</p> <p>Following properties shall be achieved in radial direction:</p> <p>0.2% Yield Strength: 530 N/mm² min.</p> <p>FATT : ≤ +80 °c</p> <p>Impact Strength (at +80°C): 55 J min.</p> <p>(Avg. of 3 Charpy V-notch specimens)</p> <p>The axial core shall be clearly marked, so that its original position can be easily identified with respect to the shaft. The stamp of the manufacturer's authorised inspector close to the identification number shall confirm traceability of the trepanned core to the forging.</p> <p>6.2.3 Radial Cores:</p> <p>BHEL reserves the right to take one or more radial cores in special cases in lieu of the axial core or in addition. The position of the cores will be determined in individual case.</p> <p>6.2.4 Reduced Fracture Deformations:</p> <p>If reduced values of the fracture deformations are achieved, the manufacturer has to prove that these are caused by local impurities only.</p> <p>6.2.5 Release for Further Manufacturing:</p> <p>On receipt of all test results, BHEL will decide further course of action for the shaft.</p> <p>6.3 NON DESTRUCTIVE EXAMINATION (Outer & Inner Quality):</p> <p>6.3.1 SCOPE OF INSPECTION</p> <p>6.3.1.1 Ultrasonic Test :</p> <p>Ultrasonic test and acceptance shall be carried out as per the Siemens specification PA 14/24.51 .</p>
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हस्ताक्षर एवं दिनांक SIGN & DATE	<p>स्वत्वाधिकार एवं गोपनीय</p> <p>Copyright and Confidential</p> <p>The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company</p> <p>इस प्रलेख में दी गई सूचना भारत भारती इलेक्ट्रिकल्स की सम्पत्ति है इसका प्रकाश एवं प्रसारण के बिना किसी भी तरह प्रमाण, जो कि कम्पनी के हित में कारिकाएँ हो न कि भाग्य ।</p>
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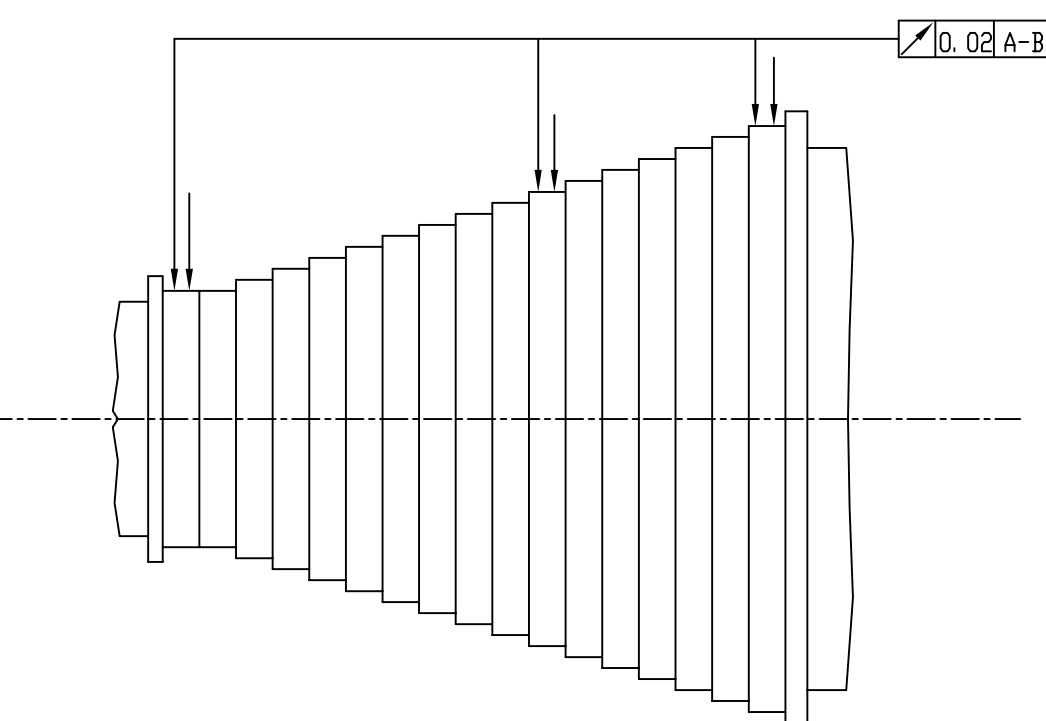
GENERATOR SIDE

PROOVE DRG. 410

NOMINAL SIZE MM		TOLERANCE RANGE	
ABOVE	UP TO	H7	h9
		UPPER	UPPER
		LOWER	LOWER
630	800	+0.080	0
		0	-0.200
800	1000	+0.090	0
		0	-0.230
1000	1250	+0.105	0
		0	-0.260
1250	1600	+0.125	0
		0	-0.310

1. RADIAL RUN OUT SHALL BE PERFORMED AT STAGE IL11L AND 17L, WITH RESPECT TO LOCATION (A-B) OF IP ROTOR (PGMA 10201). THE SURFACE FINISH AT THESE LOCATIONS SHALL BE $\frac{2.5}{\sqrt{S}}$, PERMISSIBLE RUN OUT VALUES WHICH ARE VALID FOR ALL STAGES SHALL BE AS PER THE SKETCH BELOW.

2. IF REQUIRED, HEAT STABILITY TEST SHALL BE CARRIED OUT AT PLACES INDICATED BY 1 IN THE SKETCH BELOW.



3. GROOVE SHALL BE MACHINED AS PER FOLLOWING DRAWINGS:

MOVING BLADE		GUIDE BLADE	
STAGE	DRAWING NO.	STAGE	DRAWING NO.
1L-3L	41020405012	1L	41010705014
4L-5L	41020405016	2L-10L	41020405011
6L-9L	41020405014	11L-13L	41010705013
10L-14L	41020405016	14L-15L	41010705014
15L-16L	41010705017	16L-17L	41010705012
17L	41010705018	—	—

4. LOCATION OF INSERTION GROOVES SHALL BE AS PER TECHNOLOGICAL INSTRUCTION NO. 944.004 (FV 100113) WITH $\alpha=30^\circ$.

STAGE	DRAWING NO.
1L-3L	41020422021
4L-17L	41020422022

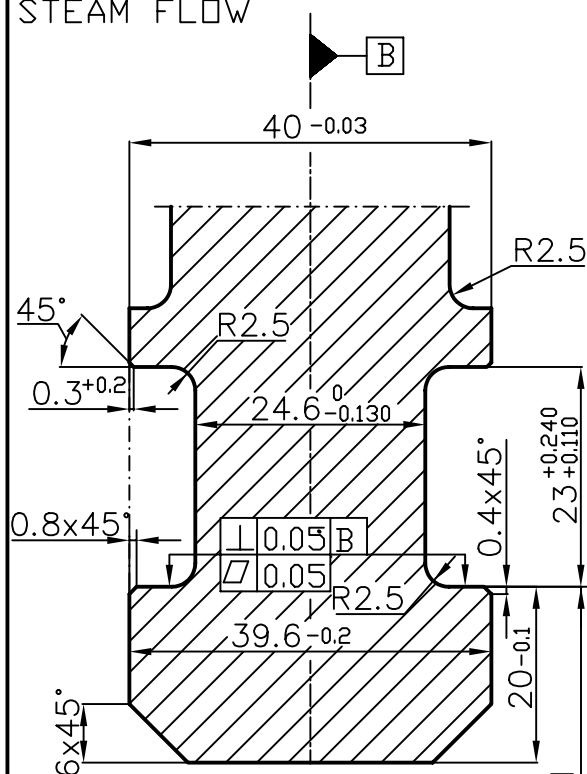
5. FOR THE VALUE OF TOLERANCE (H7,h9), SEE TOLERANCE STATEMENT.

[illegible]

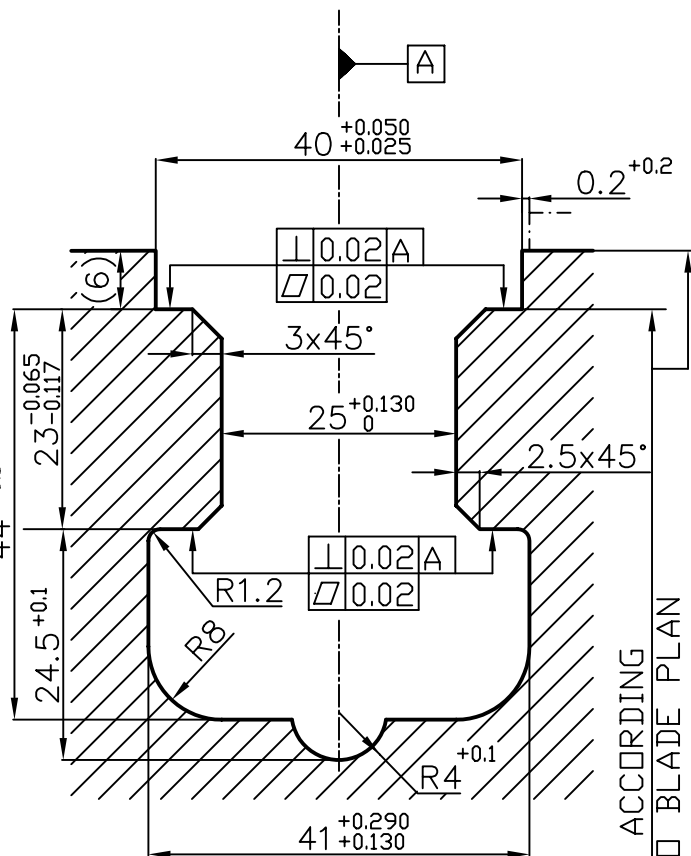
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm) FORM DG 39(B)

REV	DATE	ALTERED	REV	DATE	ALTERED H.LAL Sd/-	GMS No./ C.B.O.M. NO.	STATUS OF DRG	
		CHECKED			02			7.12.04
ZONE			ZONE	THIS DRAWING SUPERSEDES UNDER THE SAME NUMBER WITHOUT ANY CHANGE. REVISED DRAWING DEPOSITED IN WRENCH SERVER. (STE-04-F0349)	AGREED DEPT	NAME	SIGN	DATE
					STT	P.V.SINGH	Sd/-	22.8.83
GRADE OF UNTOL.DIM M/CG. C/M -AA0230208 WELDING N/B C/D AA0621104 GAS CUTTING-T3 AA0621101								

GRADE OF UNTOL.DIM M/CG. $\sqrt{M/K}$ -AA0230208 WELDING $\sqrt{B/C/D}$ AA0621104 GAS CUTTING-T3 AA0621101DIRECTION OF
STEAM FLOW3.2
ALL OVER

BLADE ROOT

Ø ACCORDING TO
BLADE DRG.

BLADE GROOVE

Ø ACCORDING
TO BLADE PLANSUPERSEDES OLD DRAWING
UNDER THE SAME NUMBERBHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DRN	NAME	SIGN	DATE	NO. OF VAR
CHD	A.K.SINGH	Sd/-	23.5.83	
APPD	V.K.SINGH	Sd/-	24.9.83	

DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011	NTS	—	—	—	—
TITLE : ROOT AND GROOVE FOR MOVING BLADE			CARD CODE	DRAWING NO.	
			7	4-10204-05016	22 23 24
			SHEET No. 01 No. OF SHEETS 01		

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6661340b
Ref.Drawing No.

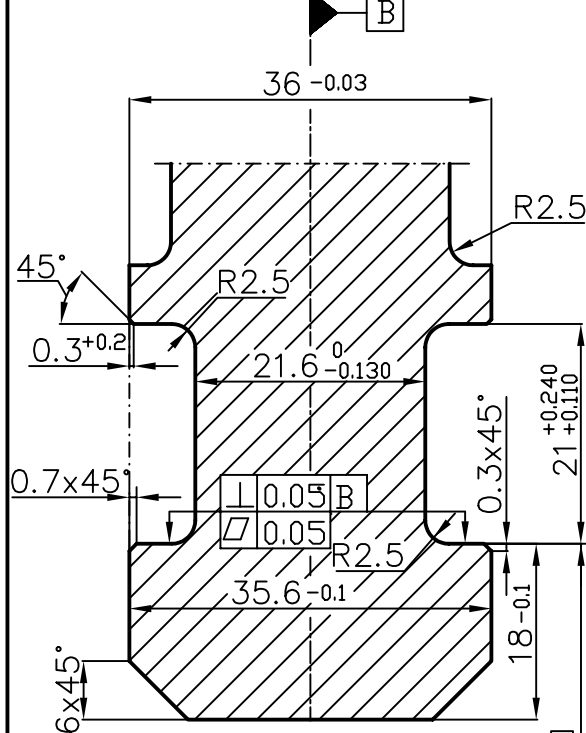
Sign & Date

Inventory No.

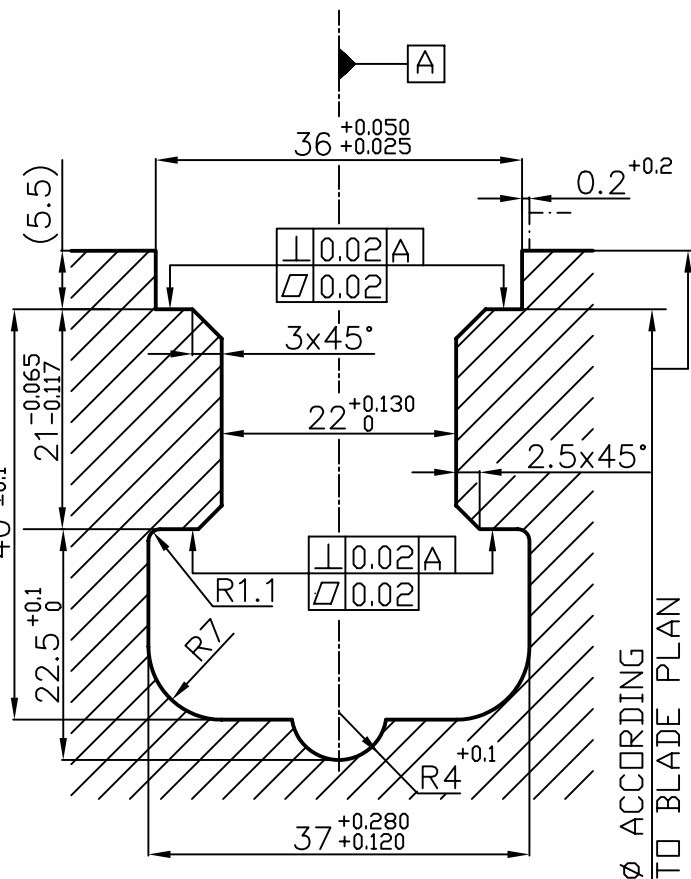
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm) FORM DG 39(B)

REV	DATE	ALTERED	REV	DATE	ALTERED H.LAL Sd/-	GMS No./ C.B.O.M. NO.	STATUS OF DRG	
		CHECKED			03			7.12.04
ZONE			ZONE	THIS DRAWING SUPERSEDES UNDER THE SAME NUMBER WITHOUT ANY CHANGE. REVISED DRAWING DEPOSITED IN WRENCH SERVER. (STE-04-F0349)	AGREED DEPT	NAME	SIGN	DATE
					STT	P.V.SINGH	Sd/-	22.8.83
GRADE OF UNTOL.DIM M/CG. √M/K -AA0230208 WELDING √B/C/D AA0621104 GAS CUTTING-T3 AA0621101								

DIRECTION OF
STEAM FLOW3.2/
ALL OVER

BLADE ROOT

Ø ACCORDING TO
BLADE DRG.

BLADE GROOVE

Ø ACCORDING
TO BLADE PLANSUPERSEDES OLD DRAWING
UNDER THE SAME NUMBERBHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DRN	NAME	SIGN	DATE	NO. OF VAR
CHD	A.K.SINGH	Sd/-	23.5.83	
APPD	V.K.SINGH	Sd/-	24.9.83	

DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011	NTS	—	—	—	—
TITLE			CARD CODE	DRAWING NO.	
ROOT AND GROOVE FOR MOVING BLADE			7	4-10204-05014	22 23 24
			SHEET No. 01 No. OF SHEETS 01		

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6661300a
Ref.Drawing No.

Sign & Date

Inventory No.

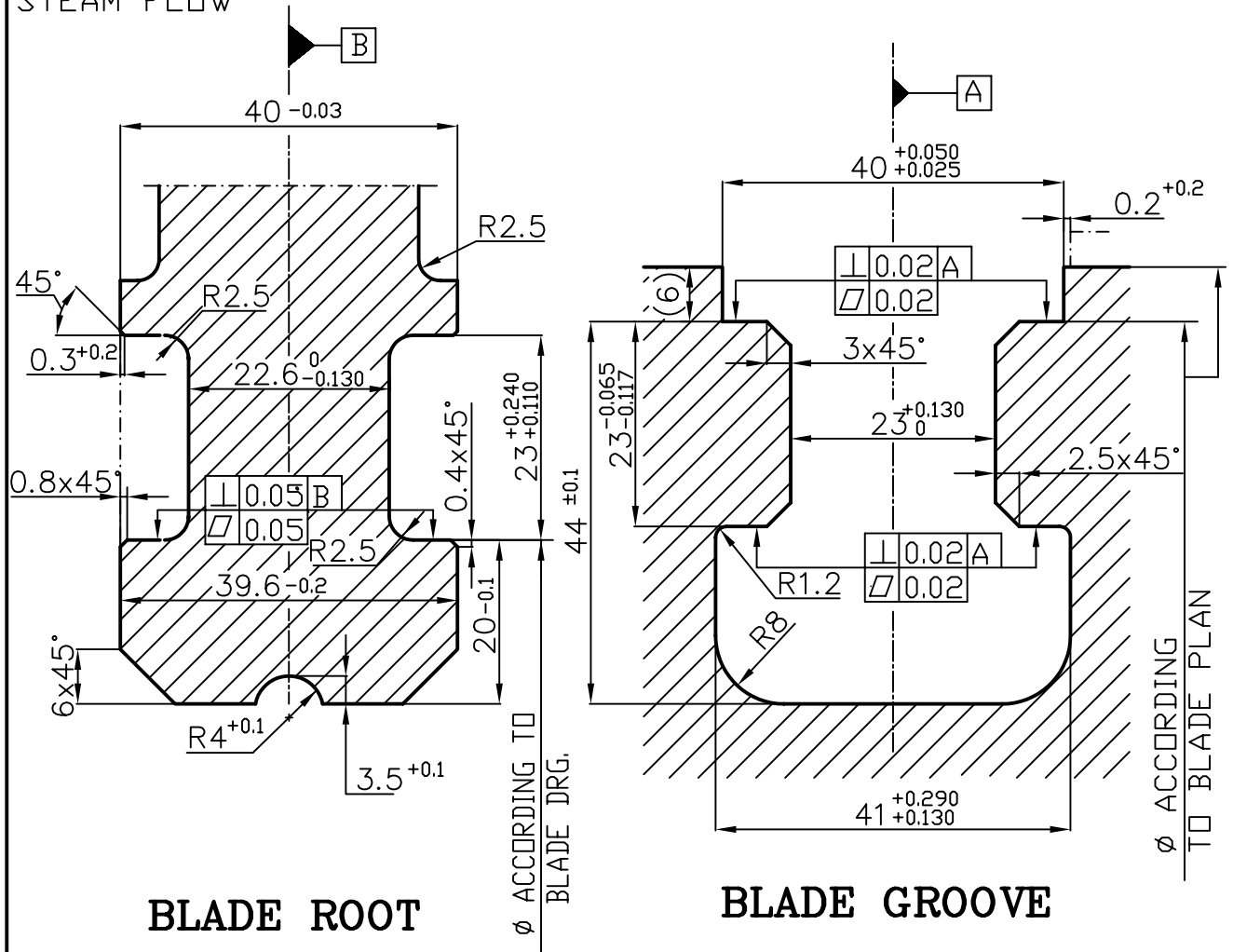
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm) FORM DG 39(B)

REV	DATE	ALTERED	REV	DATE	ALTERED H.LAL Sd/-	GMS No./ C.B.O.M. NO. 91020405000			STATUS OF DRG U
		CHECKED			CHECKED P.K.B. Sd/-				
ZONE			ZONE	THIS DRAWING SUPERSEDES UNDER THE SAME NUMBER WITHOUT ANY CHANGE. REVISED DRAWING DEPOSITED IN WRENCH SERVER. (STE-04-F0349)	AGREED DEPT	NAME	SIGN	DATE	
					STT	P.V.SINGH	Sd/-	22.8.83	

GRADE OF UNTOL.DIM M/CG. $\sqrt{M/K}$ -AA0230208 WELDING $\sqrt{B/C/D}$ AA0621104 GAS CUTTING-T3 AA0621101

DIRECTION OF STEAM FLOW ∇ 3.2 ALL OVER



BLADE ROOT

BLADE GROOVE

SUPERSEDES OLD DRAWING UNDER THE SAME NUMBER



BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DRN	NAME	SIGN	DATE	NO. OF VAR
CHD	A.K.SINGH	Sd/-	21.5.83	
APPD	V.K.SINGH	Sd/-	24.9.83	

DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011	NTS	—	—	—	—
TITLE : ROOT AND GROOVE FOR MOVING BLADE			CARD CODE	DRAWING NO. 4-10204-05012	
				SHEET No. 01 No. OF SHEETS 01	

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6661344a

Ref.Drawing No.

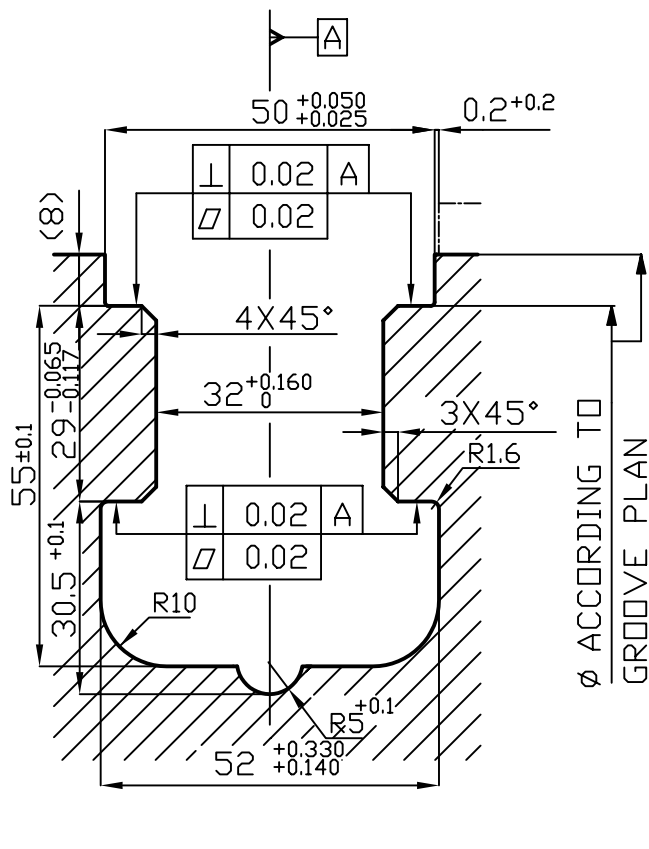
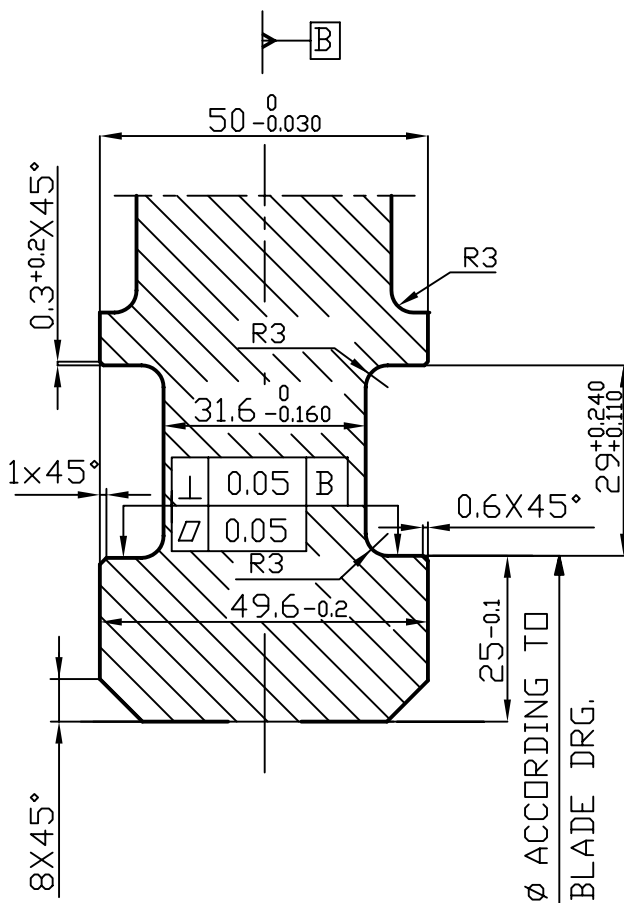
Sign & Date

Inventory No.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm) FORM DG 39(B)

REV	DATE	ALTERED	REV	DATE	ALTERED	H.LAL Sd/-	GMS No./ C.B.O.M. NO.	STATUS OF DRG
		CHECKED	02	8.12.04	CHECKED	P.K.B. Sd/-	91010705000	U
ZONE			ZONE	THIS DRAWING SUPERSEDES UNDER THE SAME NUMBER WITHOUT ANY CHANGE. REVISED DRAWING DEPOSITED IN WRENCH SERVER. (STE-04-F0353)			AGREED DEPT STT	NAME P.V.SINGH
							SIGN Sd/-	DATE 22.6.83
GRADE OF UNTOL.DIM M/CG. ϕ /M/F -AA0230208			WELDING λ /B/C/D AA0621104			GAS CUTTING-T3 AA0621101		

DIRECTION OF
STEAM FLOW32
ALL OVER

BLADE ROOT

BLADE GROOVE

SUPERSEDES OLD DRAWING
UNDER THE SAME NUMBERBHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DRN	NAME	SIGN	DATE	NO. OF VAR
CHD	S.K.G.	Sd/-	16.6.83	
APPD	V.K.S.	Sd/-	25.8.83	

DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011	NTS				
TITLE : ROOT AND GROOVE FOR MOVING BLADE			CARD CODE	DRAWING NO. 4-10107-05018	
				SHEET No. 01	No. OF SHEETS 01

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6661350k
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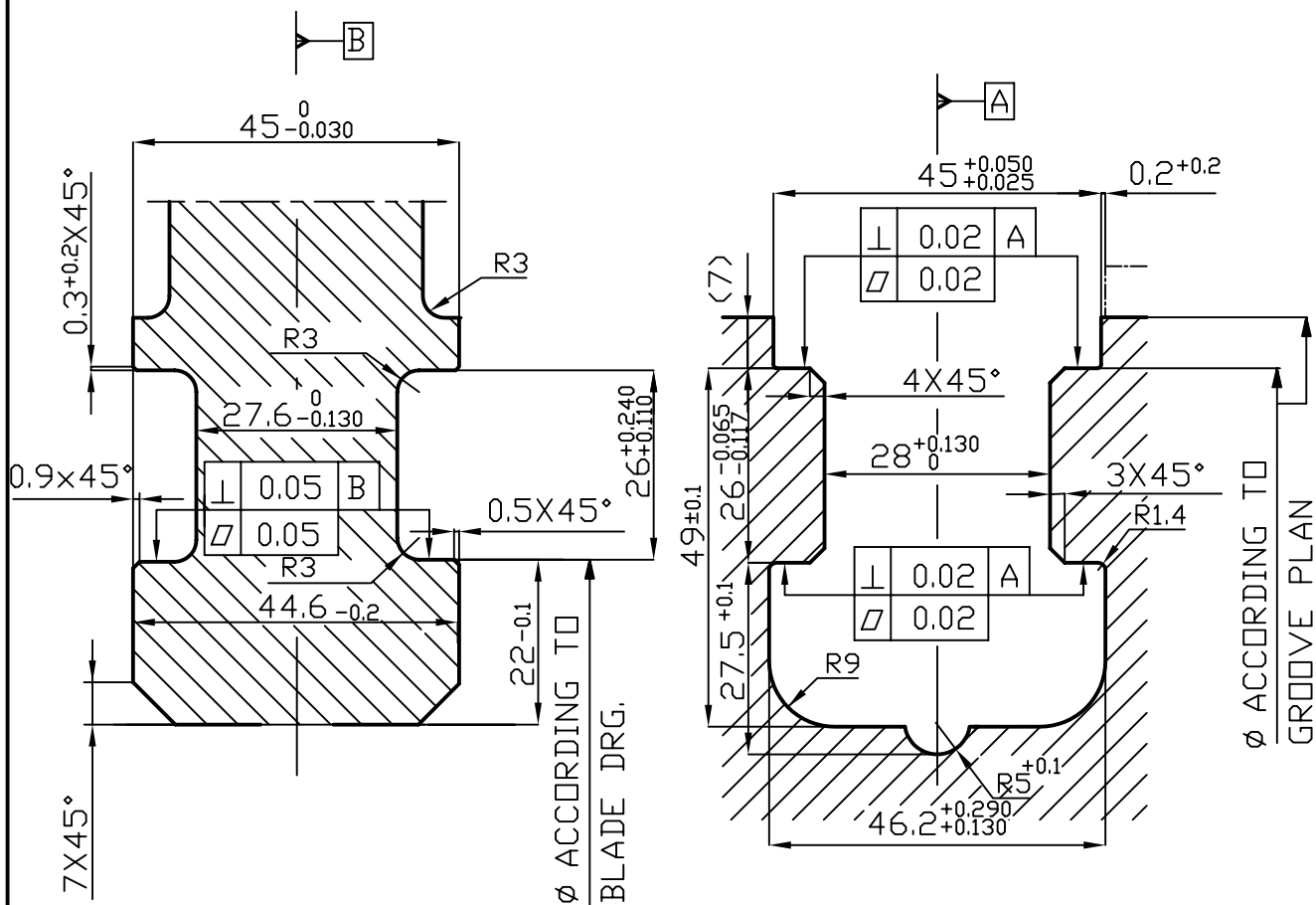
Sign & Date

Inventory No.

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm) FORM DG 39(B)

REV	DATE	ALTERED	REV	DATE	ALTERED	H.L.A.L. Sd/-	GMS No./ C.B.O.M. NO.	STATUS OF DRG
		CHECKED	02	8.12.04	CHECKED	P.K.B. Sd/-	91010705000	U
ZONE			ZONE	THIS DRAWING SUPERSEDES UNDER THE SAME NUMBER WITHOUT ANY CHANGE. REVISED DRAWING DEPOSITED IN WRENCH SERVER. (STE-04-F0353)			AGREED DEPT STT	NAME P.V.SINGH
							SIGN Sd/-	DATE 22.6.83
GRADE OF UNTOL.DIM		M/CG. ϕ /M/F		-AA0230208		WELDING λ /B/C/D	AA0621104	
						GAS CUTTING-T3		AA0621101

DIRECTION OF
STEAM FLOW32
ALL OVER

BLADE ROOT

BLADE GROOVE

SUPERSEDES OLD DRAWING
UNDER THE SAME NUMBER6661380a
Ref.Drawing No>

Sign & Date

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

DRN	NAME	SIGN	DATE	NO. OF VAR
CHD	S.K.G.	Sd/-	24.2.83	
APPD	V.K.S.	Sd/-	25.8.83	

Inventory No.

DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011	NTS	—	—	—	—
TITLE : ROOT AND GROOVE FOR MOVING BLADE			CARD CODE	DRAWING NO. 4-10107-05017	
				SHEET No. 01	No. OF SHEETS 01

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