 BPC 0007		भारत हेवी इलेक्ट्रिकल्स लिमिटेड, पिपलानी, भोपाल - ४६२०२२(भारत) सामग्री प्रबंधन विभाग BHARAT HEAVY ELECTRICALS LIMITED, PIPLANI, BHOPAL – 462022(INDIA) MATERIALS MANAGEMENT DIVISION				ENQUIRY NO E5953002 ENQUIRY DATE 25/04/25 ENQUIRY DUE DATE 05/05/25							
ENQUIRY TWO PART BID		TIN NO: 23573600001		ECC NO:AAACB4146PXM009		MPCT NO: HEL/05/01/0001/SL5/11/79		PHONE: 91-755-2500100 (7 LINE)		FAX: 91-755-2500023		WWW.BHEL.BHOPAL.COM	
SUPP NAME AND ADDRESS			SUPP CODE	REV CD	REV NO	REV DATE	NO OF CATY2	NO OF CATY3	ENQ NO OF ITEMS		INDENT NO		
OFFICE COPY				1	0	NA	0	0	1	121351051			
			GUARANTEE CERTIFICATE		Y		SUPPLY CONDITION SUPPLIER'S IDENTIFICATION MARK SHOULD BE ON EACH JOB.						
			TEST CERTIFICATE		Y								
			INSTRUCTION BOOKLET		N		TECHNICAL CONDITION AS PER DRG.						
			SAMPLE		N								
			GATE PASS		Y		INSPECTION CONDITION BY BHEL AUTHORISED TPIA AT VENDOR WORKS.						
NOTE: QUOTE PRICE BOTH IN FIGURES & WORDS.IN CASE OF MISMATCH PRICE IN WORDS WILL BE VALID,QUOTATIONS NOT BEARING ENQUIRY NO AND DUE DATE LIABLE TO BE REJECTED.													
SL NO	MATERIAL CODE	DESC				UNIT	ITEM QTY	LOT NO	LOT QTY	DEST	DELIVERY DATE		
1	BP9094676907	TA9901AZ SLIP RING ASSY TO DRG NO 14302376001 V00 REV 11. TO BE SUPPLIED IN PROPER PACKING. ONE NO IN EACH PACKING.				NO	50.000	2	25.000	213	07/07/25		
								1	25.000	213	07/06/25		
REMARK TENDER CONDITIONS AS PER NIT ON E-PROCUREMENT RENDER													
DRAWING	Y	PURCH SPEC	Y	CATALOUGE	N	PLAN	Y	TWO PART BID	Y				
S.NO	INDENT NO	ITEM NO	CATEGORY	ENQUIRY QTY.									
1	121351051	1	749140	50.000									
NOTE:BHEL,BHOPAL'S Standard Terms & Conditions BP4255/MM5533 rev02 for imports and BP4255/MM5527 rev03 for indigeneous procurements form a part of this Enquiry.Bidders may obtain from us copies of these terms and conditions if not already available.													
SPECIAL REMARKS								NAME : SHRI MANENDRA SINGH DESG : DY.MANAGER SIGN & SEAL					

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MATERIAL MANAGEMENT - TRACTION MACHINES
HEAVY ELECTRICAL PLANT, BHOPAL
BHARAT HEAVY ELECTRICALS LIMITED

BHEL ENQUIRY NO. E5953002
DUE ON 05-05-2025

NIT TERMS & CONDITIONS:

SL. NO.	DESCRIPTION	DETAILS
1.	RATE CONTRACT TERMS	We intend to enter into a Rate Contract (RC) for ordering up to 12 months from RC freeze date, i.e. RC is to be kept valid for ordering up to 12 months from RC freeze date. Ordering shall be done against firm requirement as & when needed by BHEL. BHEL reserves the right to cancel/ short close the RC at any point of time even before the expiry of RC validity without assigning any reason whatsoever it may be.
2.	ITEM DESCRIPTION	TA9901AZ SLIP RING ASSY TO DRG NO 14302376001 V00 REV 11. TO BE SUPPLIED IN PROPER PACKING. ONE NO IN EACH PACKING.
3.	QUANTITY	50 Nos
4.	QUANTITY VARIATION	± 30%
5.	DELIVERY SCHEDULE REQUIREMENT	DELIVERY OF 1ST LOT OF 25 NOS SHALL BE WITHIN 45 DAYS FROM DATE OF PLACEMENT OF PO SUBSEQUENT LOT OF 25 NOS SHALL BE WITHIN NEXT 30 DAYS FROM SCHEDULE DELIVERY DATE OF PREVIOUS LOT. EARLY DELIVERY ACCEPTABLE.
6.	DELIVERY TERMS	FOR Destination (BHEL Bhopal)
7.	DELIVERY INSTRUCTION	SUPPLIER'S IDENTIFICATION MARK SHOULD BE ON EACH JOB.
8.	PAYMENT TERMS	As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 16) i.e. 100% payment in 90 days of receipt (45 days for Micro & Small and 60 days for Medium enterprises as registered in Udyam Certificate as per relevant MSME act in force) and subject to acceptance of material and relevant documents at BHEL. Any deviation from the above payment terms, if accepted (by BHEL), shall be loaded @ SBI base rate + 6% for the purpose of bid evaluation.
9.	SPLITTING OF ORDER	RATE CONTRACT TO BE FINALIZED ON TWO SOURCES WITH QUANTITY DISTRIBUTION RATIO OF 65% & 35% TO L-1 VENDOR AND THE OTHER BIDDER ACCEPTING L-1 RATES RESPECTIVELY, SUBJECT TO MINIMUM 3 QUALIFIED BIDDERS. FOR ASCERTAINING BIDDER FOR 35% QUANTITY, HESG EQUIVALENT RATES OF L-1 BIDDER WILL BE SEQUENTIALLY COUNTER-OFFERED TO L-2, L-3 AND SO ON BIDDER UNTILL ANY BIDDER ACCEPTS THE SAME. INCASE OF ONLY 2 QUALIFIED BIDDERS, BHEL RESERVES THE RIGHT FOR DISTRIBUTION/ NON-DISTRIBUTION BETWEEN 2 BIDDERS. IN CASE OF ONLY ONE QUALIFIED BIDDER OR IN CASE NO BIDDER AGREES TO ACCEPT THE COUNTEROFFERED HESG EQUIVALENT RATES OF L-1, BHEL MAY DECIDE TO AWARD ENTIRE 100% QUANTITY TO L-1 BIDDER. DISTRIBUTION IN COMPLIANCE WITH LATEST GUIDELINES FOR MSE AND MII WILL ALSO BE FOLLOWED FURTHER.
10.	TECHNICAL PQR (T-PQR)	Technical Pre-Qualification Requirements (T-PQR) for procurement of the items is attached with the NIT. Compliance of all the points in T-PQR is mandatory. In absence of compliance of above and non-submission of documents required against the T-PQR, the Vendor's offer is liable to be rejected.



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		<p>Duly filled T-PQR with desired documents shall be submitted by the Vendor along with the offer.</p> <p><i>Information/ compliance/ documents submitted by vendor shall be authentic in all aspects. In case any deviation/ false information/ forged documents are observed / revealed later on, BHEL is free to initiate appropriate punitive proceeding against the Vendor as per Prevalent Processes and Guidelines of Company.</i></p>
11.	FINANCIAL PQR (F-PQR)	Not applicable
12.	QAP	Applicable as attached with tender documents
13.	BID PARTS	Offer shall be submitted by the bidders in Two Parts, i.e. Part-I Technical cum Commercial bid & Part-II Price bid.
14.	PENALTY / LD	As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 9) i.e. 0.5% of the undelivered portion per week of delay or part thereof, subject to a maximum of 10% of the undelivered order value owing to delayed delivery.
15.	PRICE BASIS	Firm Price basis
16.	PRICING TERMS	As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 12)
17.	PRICE VALIDITY	As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 13) i.e. Offer shall be valid for a period of 90 days from the date of Techno- commercial (Part-I) bid opening date.
18.	TAXES & DUTIES	As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 14)
19.	TECHNICAL CONDITION	As per attached List of Tools, Drawings, PQR, SPEC & QAP.
20.	SAMPLE	As per attached Spec
21.	INSPECTION CONDITION	BY BHEL AUTHORISED TPIA AT VENDOR WORKS
22.	TEST CERTIFICATE	All Material TC to be supplied along with material as per Spec. and TC should incorporate Spec.
23.	GUARANTEE / WARRANTY	As per BHEL GTC of ENQUIRY (BP200102B, Cl. No. 18)
24.	GUARANTEE CERTIFICATE	GC to be supplied along with the material
25.	EVALUATION CRITERIA	Overall L1 basis
26.	BID SECURITY/ Earnest Money Deposit (EMD)	Not Applicable
27.	PERFORMANCE SECURITY (PBG)	Not Applicable
28.	REVERSE AUCTION	Not Applicable



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29.	MSE PREFERENCE	As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 29)
30.	PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA)	<p>As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 33)</p> <p>For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/ Non-local supplier and purchase preference to Class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 19.07.2024 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT.</p> <p>The local content to categorize a supplier as a Class-I local supplier / Class-II local supplier / Non-Local supplier and purchase preference to Class-I local supplier, is as defined in above circular issued by DPIIT/ Nodal Ministry.</p> <p>Bidders to also inform the Actual Percentage of the Local Content and the Complete Address of the Location of Local Value Addition as per the attached MII format, failing which no purchase preference shall be granted.</p> <p>In case the bid value is more than Rs. 10 Crore, the declaration relating to the Actual Percentage of the Local Content and the Complete Address of the Location of Local Value Addition shall be Certified by the Statutory Auditor or Cost Auditor, if the OEM is a Company and by a Practicing Cost Accountant or a Chartered Accountant for OEM other than Companies as per the above circular.</p> <p>For contracts valuing more than Rs 10 Crores, local content (in cases of self-certification submitted by bidders at the time of tendering) will be re-verified during execution of contract by Cost/ Chartered Accountant/ Statutory Auditor/Cost Auditor (as applicable) and in case of defaults, penalty upto 10% of the contract value shall be imposed. However, contract once awarded shall not be terminated on this account.</p> <p><i>Bidders or successors can be debarred for false declarations for up to 2 years. Debarred suppliers not eligible for preference in any other procuring entity.</i></p>
31.	INTEGRITY PACT (IP)	Not Applicable
32.	RESTRICTION UNDER RULE 144 (xi) GFR	As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 34)
33.	ANNEXURE-IX	The Bidder/Supplier/Contractor will, when presenting his bid, declare whether other Family Firms or Sister Concern Affiliates/Subsidiary firms are participating in the same tender, so as to eliminate the possibility of cartel formation. Format for declaration is available in the NIT documents for this enquiry (Annexure-IX). Same is to be submitted with the offer.
34.	BIDDER'S DECLARATION	<p>The bidder declares that they will not enter into any Illegal or Undisclosed Agreement or Understanding, whether Formal or Informal with other bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.</p> <p>In case, the bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant Policies/ Guidelines.</p>



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35.	CONFLICT OF INTEREST AMONG BIDDERS/ AGENTS	<p>A bidder shall not have conflict of interest with other bidders. Such conflict of interest can lead to anti-competitive practices to the detriment of Procuring Entity's interests. The bidder found to have a conflict of interest shall be disqualified. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:</p> <p>a) they have controlling partner (s) in common; or</p> <p>b) they receive or have received any direct or indirect subsidy/ financial stake from any of them; or</p> <p>c) they have the same legal representative/agent for purposes of this bid; or</p> <p>d) they have relationship with each other, directly or through common third parties, <u>that puts them in a position to have access to information about or influence on the bid of another Bidder;</u> or</p> <p>e) Bidder participates in more than one bid in this bidding process. Participation by a Bidder in more than one Bid will result in the disqualification of all bids in which the parties are involved. <u>However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from one bidding manufacturer in more than one bid;</u> or</p> <p>f) In cases of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorise only one agent/dealer. There can be only one bid from the following:</p> <ol style="list-style-type: none"> 1. The principal manufacturer directly or through one Indian agent on his behalf; and 2. Indian/foreign agent on behalf of only one principal; <p style="text-align: center;">or</p> <p>g) A Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the contract that is the subject of the Bid; or</p> <p>h) In case of a holding company having more than one independently manufacturing units, or more than one unit having common business ownership/management, only one unit should quote. Similar restrictions would apply to closely related sister companies. Bidders must proactively declare such sister/ common business/ management units in same/ similar line of business. "</p>
36.	EVALUATION IN CASE OF MORE THAN ONE L-1 BIDDER	<p>In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.</p> <p>In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s).</p> <p>Ranking will be done accordingly. Decision of BHEL in such situations shall be final and binding.</p>
37.	SPECIAL CONDITIONS	<p>Bidders who fall under MSE (Micro & Small Enterprises only) and fail to upload 'UDYAM Registration Certificate (URC)' shall automatically be considered as Non-MSE supplier for this tender.</p> <p>Further, it is to be noted that MSE benefits are not being extended to Agent/ Dealer/ Trader/ Distributor (i.e. Other than manufacturer). Supplier has to also provide supporting document(s) such as Agreement Between OEM & Bidder(s) etc.</p> <p>Identification must. Soon after rejection of material, it is to be ensured by supplier that material should be taken back maximum within two weeks after communication for</p>



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		<p>rectification/ replacement & supply back the rectified/ fresh material to BHEL Bhopal within 30 days from rejection. In the event of non-lifting of rejected material by supplier, BHEL will not be responsible for loss of such items to the supplier in any case.</p> <p>Offers of suppliers who are in 'HOLD/BANNED' status in BHEL Bhopal PMD shall not be considered.</p> <p>Unregistered vendors to submit documents required for registration to BHEL Portal Online (https://bhel.com/supplier-registration).</p>
38.	OTHER TERMS & CONDITIONS	<p>Other Terms & Conditions as per attached BHEL GTC of ENQUIRY (BP200102B)</p> <p>Any deviation of NIT, BHEL GTC of ENQUIRY (BP200102B) and BHEL PO Terms, where vendor response is not affirmative to be clearly indicated, else BHEL will consider that all above Terms & Conditions are acceptable to vendors.</p>
39.	GEM REGISTRATION	<p>As you are kindly aware that Government e-Marketplace (GeM) is a one stop portal to facilitate Online Procurement of Goods & Services required by various Government Departments/ Organizations/ PSUs.</p> <p>BHEL being a PSU, would like that its suppliers/ contractors also have visibility on this portal so that GeM can be used for procurement by BHEL.</p> <p>Hence, you are requested to get yourselves registered on GeM.</p>
40.	TENDER FEE	Not applicable
41.	BID SUBMISSION WITHIN DUE DATE & TIME	<p>No request for extension of tender due date will be entertained at the time of tender opening and after due date under any circumstances. Hence, all bidders are requested to submit their bid well within due date and time only.</p> <p><i>BHEL reserves the right for extension of tender based on the situation without assigning any reason whatsoever it may be.</i></p>
42.	DOCUMENTS TO BE FURNISHED ALONG WITH YOUR QUOTATION	<p>Signed and Sealed copy of:</p> <ul style="list-style-type: none"> - NIT - BHEL GTC of ENQUIRY (BP200102B) - BHEL PO Terms <p>Duly Filled, Signed and Sealed copy of:</p> <ul style="list-style-type: none"> - T-PQR along with all supporting documents - Annexure-IX in Company Letterhead - PPP-MII Certificate for local content - Techno-Commercial Annexure <p>Others:</p> <ul style="list-style-type: none"> - UDYAM Registration Certificate (<i>as applicable for MSME bidders only</i>)

IT IS HEREBY MENTIONED THAT THIS IS E-TENDER SO OFFER SUBMITTED THROUGH E-PROCUREMENT PORTAL (www.eprocurebhel.co.in) SHALL ONLY BE CONSIDERED.

Techno-Commercial Annexure
(To be filled by supplier and submit with offer)

Tender No.		E5953002 due on 05/05/2025		
Description :		RATE CONTRACT FOR TA9901AZ SLIP RING ASSY TO DRG NO 14302376001 V00 REV 11. TO BE SUPPLIED IN PROPER PACKING. ONE NO IN EACH PACKING. TENDER QTY.: 50 Nos, +/- 30% Delivery required as per NIT.		
Sr. No.	ELEMENTS	Standards	To be offered/confirmed by supplier	Remarks, if any
1	Quotation reference no. & date	As per supplier		
2	HSN / SAC code	As per supplier		
3	Quotation currency	In INR		
4	Contact person	As per supplier		
5	Phone / Mobile	As per supplier		
6	E-Mail	As per supplier		
7	Order to be placed on (Also provide supplier code at BHEL Bhopal, If registered)	As per supplier		
8	Address	As per supplier		
9	Please specify delivery in weeks/ days (Specify item wise, lot wise as per RFQ)	As per NIT/ Accepted with deviation (If select Accepted with deviation, please mention the deviation)		
10	Rate quoted on "Firm" price basis	Yes		
11	Quoted for all the items and full quantity of tender enquiry	Yes / No. (If "No" please mention item number with Qty of regreted items)		
12	Technical specifications	Accepted as per NIT / Accepted with deviation (If select Accepted with deviation, please mention the deviation)		
13	Inspection	As per NIT/ Accepted with deviation (If select Accepted with deviation, please mention the deviation)		
14	Test certificate & Gurantee certificate as per NIT, Drawings and specification will be submitted along with each consignment	Yes (In case of "No" your offer may be rejected).		
15	Brand name, if any.	As per supplier		
16	Supply from	As per supplier		
17	Terms of delivery ("FOR DESTINATION " means freight & insurance upto destination in supplier's scope (Destination: CRX Divn, BHEL Bhopal)	Accepted/ Accepted with deviation (If select Accepted with deviation, please mention the deviation)		
18	Transit insurance (In supplier's scope)	As per NIT/ Accepted with deviation (If select Accepted with deviation, please mention the deviation)		
19	CGST RATE (IN %)	As per supplier		
20	SGST RATE (IN %)	As per supplier		
21	IGST RATE (IN %)	As per supplier		
22	UGST RATE (IN %)	As per supplier		
23	Are you manufacturer of quoted item (s).	Yes / No		
24	Are you registered under MSMED ACT 2006 as small or micro. NOTE: - Firms registered under medium scale shall not be considered eligible for MSE benefits.	Yes / No (If select Yes, please enclosed valid UDYAM certificate)		

Techno-Commercial Annexure
(To be filled by supplier and submit with offer)

Tender No.		E5953002 due on 05/05/2025		
Description :		RATE CONTRACT FOR TA9901AZ SLIP RING ASSY TO DRG NO 14302376001 V00 REV 11. TO BE SUPPLIED IN PROPER PACKING. ONE NO IN EACH PACKING. TENDER QTY.: 50 Nos, +/- 30% Delivery required as per NIT.		
Sr. No.	ELEMENTS	Standards	To be offered/confirmed by supplier	Remarks, if any
25	Terms of Payment (100% payment in 90 days of receipt (45 days for Micro & Small and 60 days for Medium enterprises as registered in Udyam certificate as per relevant MSME act in force) and subject to acceptance of material and relevant documents at BHEL. Pl refer GTC BP200102B)	As per NIT/ Accepted with deviation (If select Accepted with deviation, please mention the deviation)		
26	SELF CERTIFICATION OF MINIMUM LOCAL CONTENT, IF MORE THAN 50% VALUE ADDITION IS IN INDIA. (Note- In case of tenders worth more than Rs. 10 crores, Suppliers shall necessarily submit certificate from statutory auditor or cost auditor or cost accountant or CA) Please also specify the amount of local content in India. EXAMPLE :if 100% INDIGENOUS (MADE IN INDIA) MARK "Y"/100%	As per supplier		
27	Details of location of value addition / manufacturing	As per supplier		
28	Other Charges (If any)	Applicable / Not Applicable. (If applicable please mention percentage (%) / Value (along with type of charges).		
29	Penalty for delayed performance as per BP200102B & NIT	Yes / No (In case of "No", your offer will be loaded suitably)		
30	Confirmation that documents pertaining to technical PQR & Financial PQR has been submitted	Yes / No		
31	Acceptance to "REVERSE AUCTION" if conducted (As per BHEL's RA policy)	Yes / No	Not Applicable	
32	Submission of Declaration format with duly sealed & signed (Annexure IX, refer attached) regarding whether other family firms or sister concern affiliates / subsidiary firms are participating in the same tender.	(Yes / No) If No please specify the reason.		
33	General terms and conditions of enquiry (Form No. BP-200102B) and BHEL PO Terms & Conditions is Acceptable.	Yes (In case of "No" your offer may be rejected).		
34	Quotation Validity will be 90 days from the date of techno-commercial bid opening.	Yes		
35	Tender fees submitted	Yes / Not Applicable	Not Applicable	

TME/PQR/1856

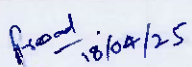
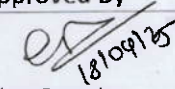
Date – 18/04/25

Technical Pre-Qualification (T-PQR) for procuring Slip Ring Assembly of TA9901AZ

S. No.	Description	Supplier/ Vendor to Comment	
		Complied/ Not Complied	Documents to be submitted.
1	Vendor shall supply Slip Ring Assembly exactly as drawing mentioned in BHEL enquiry.	Yes/ No	-
2	Supply experience in preceding 5 years (from original enquiry due date) of same/similar* item to Indian Railways or any Traction Machine Manufacturer.	Yes/No	Un-price PO copies of same/ similar item in preceding 5 years from original enquiry due date to Indian Railways or any Traction Machine Manufacturer. & Supply proof (Delivery Challan/invoice etc.) of corresponding PO in preceding 5 years from original enquiry due date.
3	Supplier should be an Original equipment manufacturer and not a trader.	Yes/No	-
4	First lot/ sample shall be approved by BHEL before start of bulk/regular supply in case of PO placement for vendor supplying this item for first time in BHEL Bhopal.	Yes/No	-
5	Manufacturing & Testing facility assessment may be carried by BHEL at suppliers works. Vendor to confirm the same.	Yes/No	-

Notes:-

1. Compliance of all the points in above PQR is mandatory. In absence of compliance of above, vendor's offer is liable to be rejected
2. Declaration by vendors regarding information / compliance submitted by vendor shall be correct in all respect. In case any deviation/false information is revealed later on, BHEL is free to initiate appropriate punitive proceeding as per prevalent processes and guidelines of company.
3. * (Stainless steel slip ring assy/ Epoxy moulding with brass ring slip ring assy shall of more than 200 mm outer diameter be considered as similar item.

Prepared By	Approved By
 Prasad Telang Manager/ TME	 Vikas Rawtiya Sr. DGM/ TME

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY ASSURANCE PLAN FOR SLIP RING ASSY TO BHEL ORDERING SPECIFICATION/DRAWING AS PER PO

QUALITY PLAN NO. ~ QAP/QTM/VENDOR QAP/2023-24/SLIP RING ASSY DTD 21.02.2024 REV 00
Reference Document- PO DRAWING/SPECIFICATION

Page: 1 of 1

COMPONENT	CHARACTERISTICS	TYPE OF CHECK	QUANTAM OF CHECK		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	INSPECTION AGENCY	REMARKS
			TP	TPIA					
Raw material TC	a) Mechanical properties b) Chemical properties	Record review	100%	100%	As per drawing, sub drawing & relevant specification	As per drawing, sub drawing & relevant specification	MTC	BHEL/TPIA	TEST LAB NABL/EQUIVALENT ACCREDITED/SOURCE MILL /Supplier to get the raw material correlated with material TC.
Dimension	Dimension	TC verification & Measurement	100%	10%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TPIA	Witness
Testing	(HV TEST, IR and joint Resistance)	Testing	100%	10%	As per drawing & specification	As per drawing & specification	Supplier record	Supplier record	Witness
Identification of grade of vendor name, PO & job serial no.,	Visual	Visual	100%	10%	As per drawing & specification	As per drawing & Specification	Supplier record	BHEL/TPIA	Witness
Packing to avoid transit damage	Visual	Visual	100%	10%	As per drawing & specification	As per drawing & specification	Packing list for each kit box	BHEL/TPIA	Packing to be such that no damages should occur during transit. 1 kit items should be placed in on 1 box

Prepared by

Approved by

अभिषेक / Engineer
कपूर टी. एम. विमान / O.T.
श्री. राजेश. एल. ओमकार

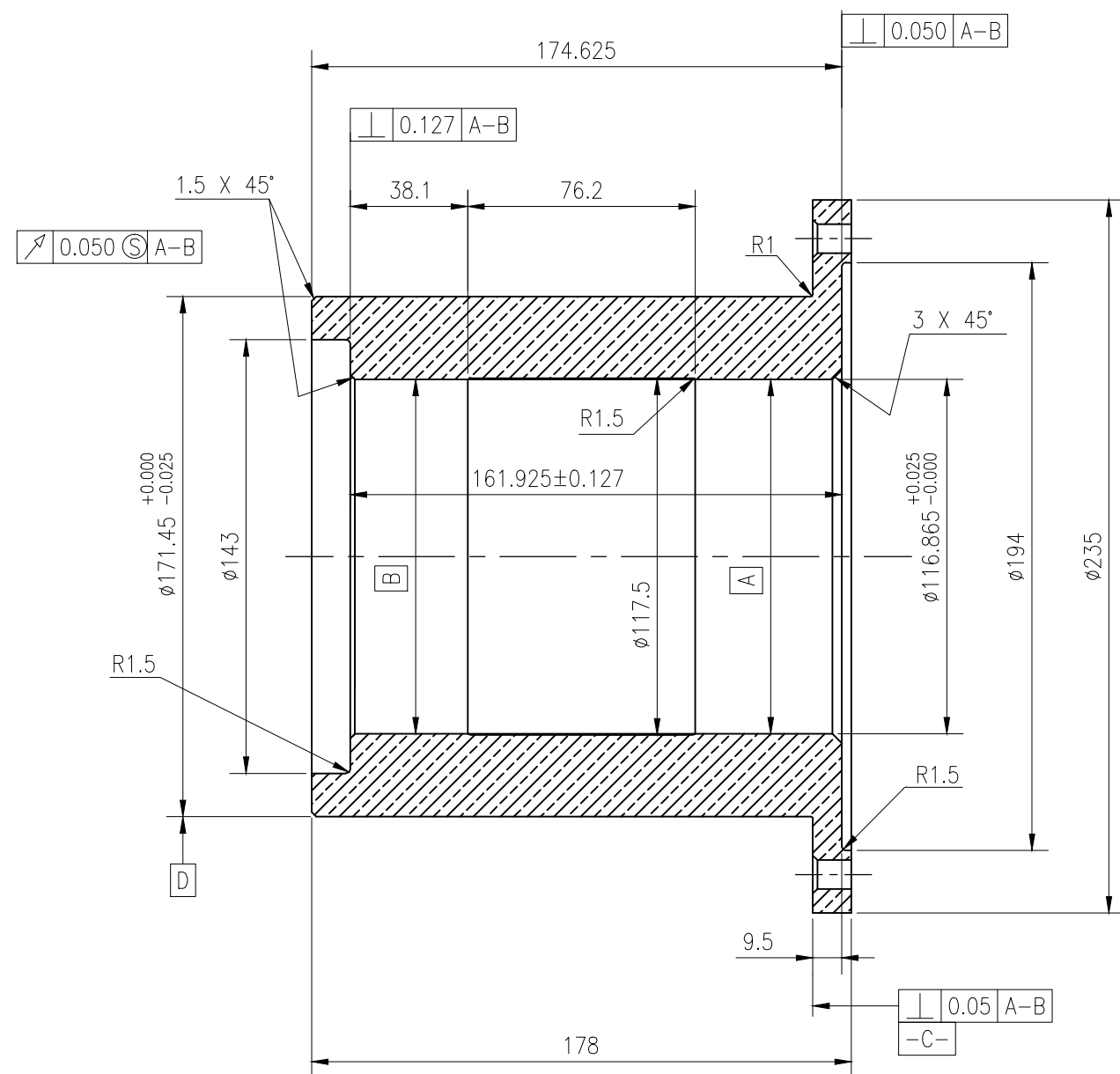
गजेंद्र सिंह राठौर / G.S. RATHORE
उप प्रबंधक/Dy. Manager
स्कूटी एम. विभाग / QTM Division
डी एच ई एल. भोपाल/B.H.E.L., BHOPAL

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

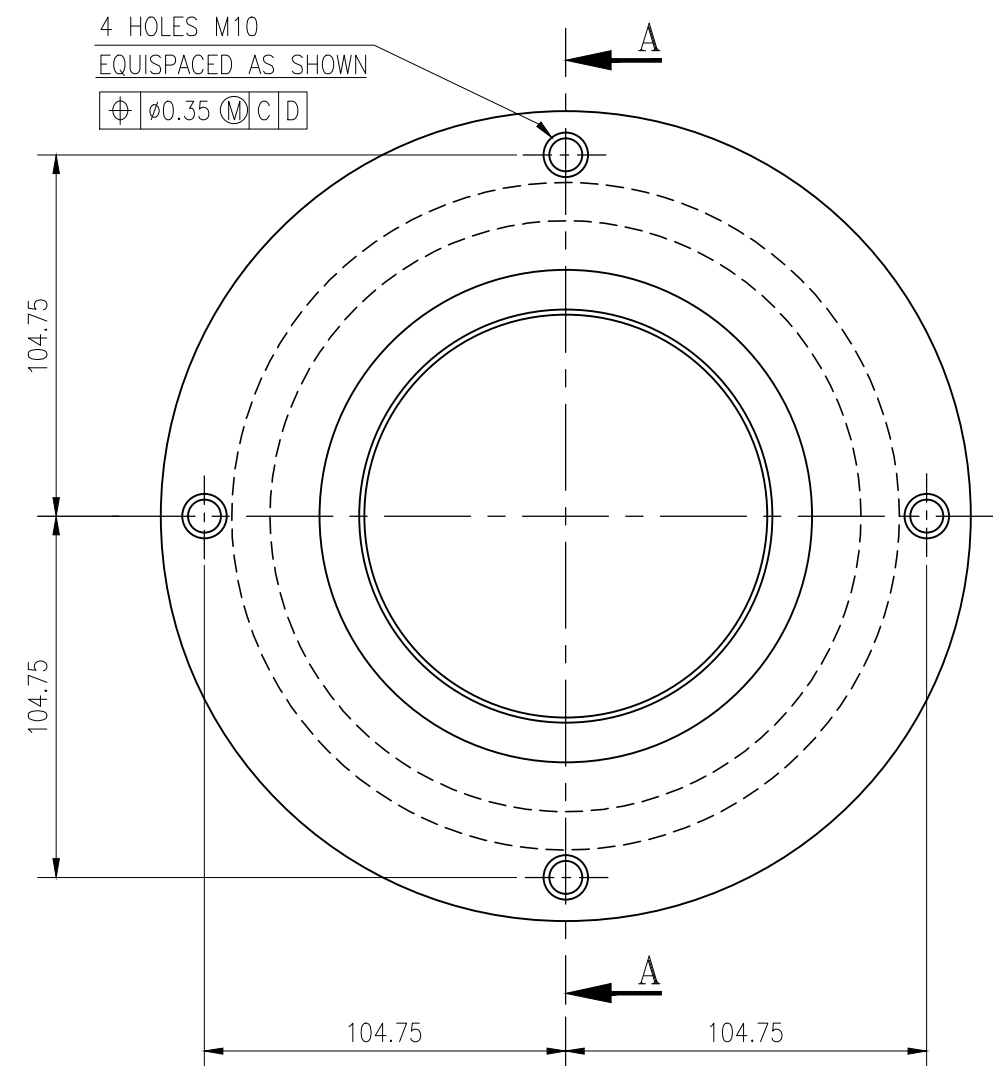
FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

DRG. NO. 2 430 23 76 001



SECTION—'AA'



NOTE :-

1. MACHINING ALLOWANCE OF 3-4MM TO BE IN CASTING FOR ALL MACHINED DIMENSIONS.

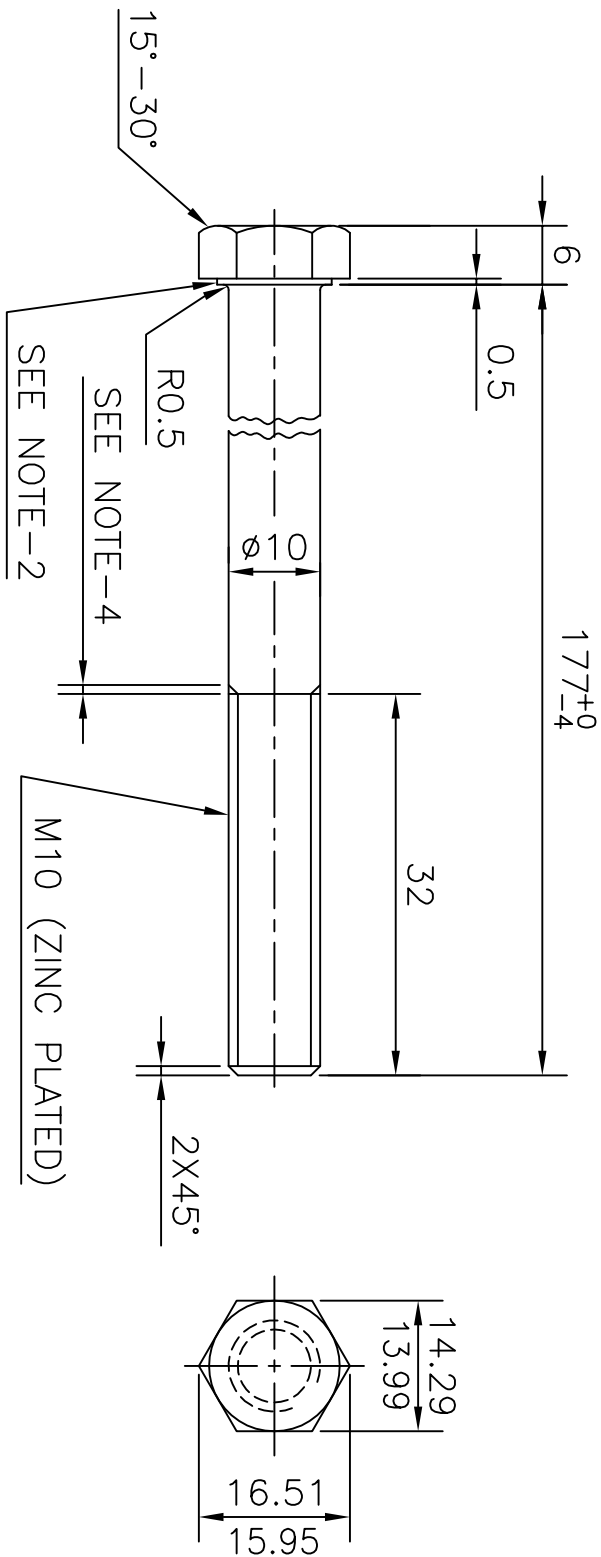
R/WT. 20.9 KG.			001		HUB-SLIP RING MODULAR IRON										TM02349			16.3								
59	64	65	75		78	79	25	27	29	58	59	60	77	29	31	34	45	55	57	58	65	72				
VAR00			REMARKS		VAR. NO.	ITEM NO.	DESCRIPTION						STD	DRAWING NO.		IT.ND.	MATL. CODE		UNIT	UNIT	UNIT WT.		ZONE			
																32	33	46	54	68	QTY.		US			
																VAR.										
28 → CARD TYPE-3									28 → CARD TYPE-1									28 → CARD TYPE-2								
ADDITIONAL INFORMATION SIM DRG. NO. 8345732									उत्पाद का प्रकार या ग्राहक/परियोजना का नाम																	
STATUS OF DRAWING									TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT																	
DISTRIBUTION OF PRINTS									TRACTION ALTERNATOR TA9901AZ																	
TME -1 TAM -4 TNX -1									बी.एस.ई.एल. भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल BHARAT HEAVY ELECTRICALS LTD. BHOPAL																	
									बन्या नाम /NAME हस्ता/SIGN. दि./DATE वै कि DRN. SKG -sd- 18.2.02 संख्या डाटा DK -sd- 18.2.02 NO. OF स्वीकृत M.BHAKTA -sd- 18.2.02 VAR.																	
REV. 01 DATE 26.3.03 APPROVED									पिभागा अन.टल.नाप की श्रेणी अनुपात भार कि. ग्रा. उसे. ड्रॉग का संदर्भ मद संख्या DEPT. TME UNTOL. DIMS. GR. SCALE WEIGHT (K.G.) REF. TO ASSY. ITEM NO. TOL CODE.405 TM20079 NTS 14302376001 001																	
5, 18.5									HUB-SLIP RING																	
ZONE MATL. SPECN. TM02349 WAS NOT ON.									ड्रॉगिंग क्र./DRGAWING NO. 2 430 23 76 001 पन्नों क/SHIT NO.01 पन्नों की संख्या / No.OF SHIT 01																	

REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED
			03	04.12.16	A.J. <i>[Signature]</i> P.T. <i>[Signature]</i> V.R. <i>[Signature]</i>	02	5.12.13	<i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i>	01	27.7.12	<i>[Signature]</i> <i>[Signature]</i> <i>[Signature]</i>
					DRAWING REVISED IN LINE WITH OEM DRAWING.			ID DIM. 171.45(+0.051,-0.0) WAS 171.81(+0.050,-0.0)			DRG. DIGITIZED & UPLOADED.

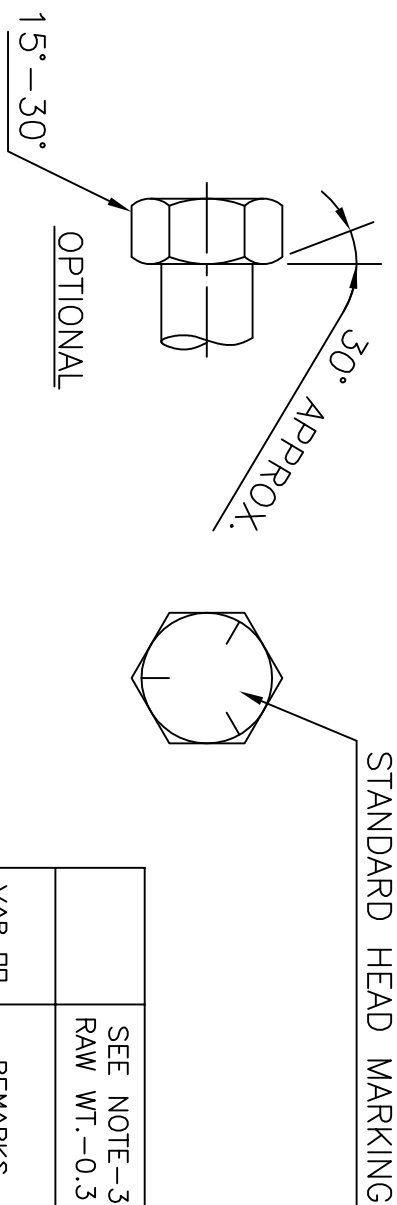
DRG. NO. 3 430 23 76 001


NOTES :-

1. TORQUE REQUIREMENTS TIGHTENING TORQUE – 2-3 KG/M.
2. AXIS OF HEAD MUST BE CONCENTRIC WITH AXIS OF BOLT WITHIN 0.86 TIR. BEARING FACE SHALL BE FLAT WITH DIA. OF 12.85-14.27 AND SQUARE WITH BOLT AXIS WITHIN 2° (REF. – 0.457 MAX. TOTAL RUNOUT).
3. MATERIAL TO BE STEEL AS PER IS:1367 GR:8.8
4. FOR THREAD RUNOUT REFER AA0231850.



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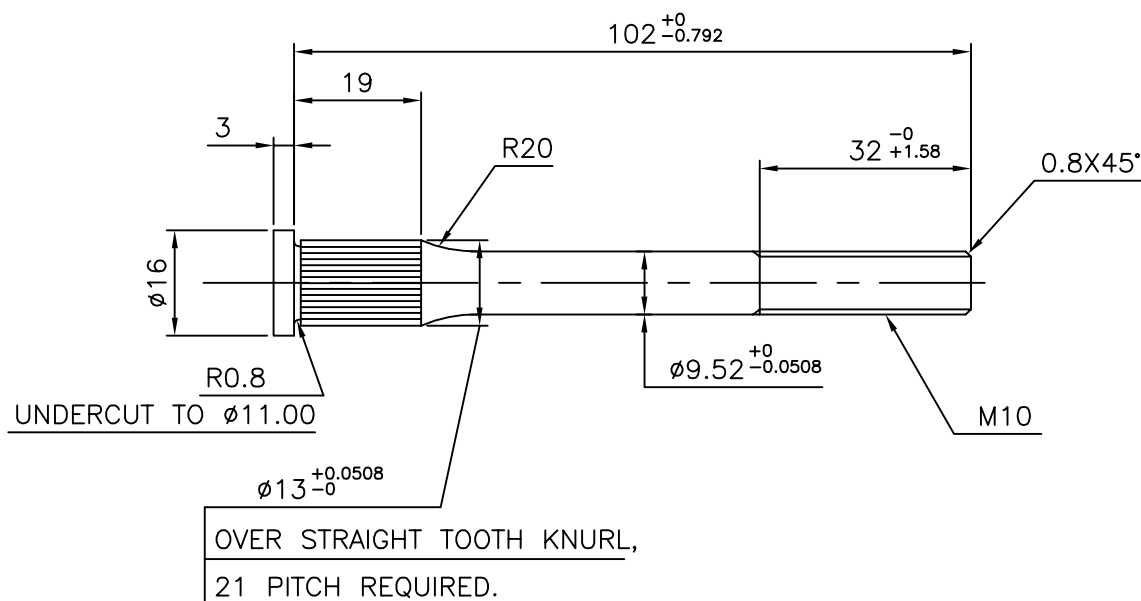
[illegible]

SIGN. & DATE		REF.		
ADDITIONAL INFORMATION SIM DRG. NO.—9422563				
STATUS OF DRAWING				
DISTRIBUTION OF PRINTS				
TME — 1 TAM — 3				
TNX — 1				
<div><div><p>भारत हेवी इलेक्ट्रिकल्स लिमिटेड भोपाल</p><p>BHARAT HEAVY ELECTRICALS LTD. BHOPAL</p></div><div><p>उत्पाद का प्रकार या ग्रहण/परिचयना का नाम TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT</p><p>TRACTION ALTERNATOR TA9901AZ</p></div></div>				
क्रमांक DRN	नाम/NAME	हस्ता/ SIGN	दिनांक/ DATE	वे.प्र. की संख्या NO. OF VAR
उद्देश्य CKD	DK	—sd—	4.04.02	
उत्पादित APPD	MB	—sd—	4.04.02	

[illegible]

(ALL DIMENSIONS ARE IN mm)

REV.	DATE	ALTERED <i>Doni</i>
03	18.04.15	CHECKED <i>✓</i>
		APPROVED <i>✓</i>
MATERIAL SPEC. AA12116 WAS AA12114. THREAD DIMENSION M10 WAS M10-16 UNC-2A THD.		



NOTE:—


1. MACHINE ALL OVER.



बीएचईएल
BHEL

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
भोपाल
BHARAT HEAVY ELECTRICALS LTD.
BHOPAL

गाम NAME		हस्ता. SIGN	दिनांक DATE	वे. रि. की संख्या NO. OF VAR.
खलाया DRN	SKG	—sd—	18.02.02	
जोधा CKD	DK	—sd—	18.02.02	
अनुमोदित APPD	M BHAKTA	—sd—	18.02.02	

विभाग DEPT	TME	अन. टल. नाप की त्रेणी UNTOL.DIMS. GR.		अनुपात SCALE NTS	भार कि०ग्रा. WEIGHT (K.G.)	उत्सेष्टाई ग का संदर्भ REF. TO ASSY. DRG. 14302376001	मद क्र. ITEM NO. 005	मद संख्या NO. OF ITEM 001
कोड CODE	405	—						
शीर्षक/ TITLE STUD—SLIP RING TRACTION ALTERNATOR—TA9901AZ						आरेख क्र./DRAWING NO. 4 430 23 76 002		पुन/REV. 03
						पृष्ठ क्र./SHT. No. 01	पृष्ठों की संख्या/NO. OF SHT. 01	

(ALL DIMENSIONS ARE IN mm)

Technical drawing of a shaft assembly. The drawing shows a shaft with a total length of 142 (+0, -0.792). The shaft has a diameter of $\phi 13$ (+0.0508, -0) in the middle section. The left end features a knurl with a pitch of 21 and a diameter of $\phi 16$. The knurl has a width of 19 and a fillet radius of R20. The shaft is secured with a nut and washer. The nut has a width of 3 and a diameter of $\phi 16$. The washer has a thickness of 3 and a diameter of $\phi 16$. The shaft has a fillet radius of R0.8 at the transition from the knurl to the main shaft. The right end of the shaft has a diameter of $\phi 9.52$ (+0, -0.0508) and a length of 32 (+1.58, -0). The shaft is secured with a nut and washer. The nut has a width of 3 and a diameter of $\phi 16$. The washer has a thickness of 3 and a diameter of $\phi 16$. The shaft has a fillet radius of R0.8 at the transition from the knurl to the main shaft. The right end of the shaft has a diameter of $\phi 9.52$ (+0, -0.0508) and a length of 32 (+1.58, -0). The shaft is secured with a nut and washer. The nut has a width of 3 and a diameter of $\phi 16$. The washer has a thickness of 3 and a diameter of $\phi 16$.

Dimensions and Callouts:

- Total Length: 142 (+0, -0.792)
- Knurl Diameter: $\phi 16$
- Knurl Width: 19
- Knurl Pitch: 21 PITCH REQUIRED.
- Knurl Fillet Radius: R20
- Main Shaft Diameter: $\phi 13$ (+0.0508, -0)
- Shaft Fillet Radius: R0.8
- Right End Diameter: $\phi 9.52$ (+0, -0.0508)
- Right End Length: 32 (+1.58, -0)
- Right End Thread: M10
- Left End Washer Thickness: 3
- Left End Washer Diameter: $\phi 16$
- Left End Nut Width: 3
- Left End Nut Diameter: $\phi 16$
- Undercut: UNDERCUT TO $\phi 11.11$

1. MACHINE ALL OVER.

Generated from eOffice by Ravi Dikshita PaduA5-1(RBP)-MINX354-ENGINEER (KDE)-NKA400-CHIEF PROJECT SUPERINTENDENT (HEP) on 25/04/2025 10:02 am

(ALL DIMENSIONS ARE IN mm)

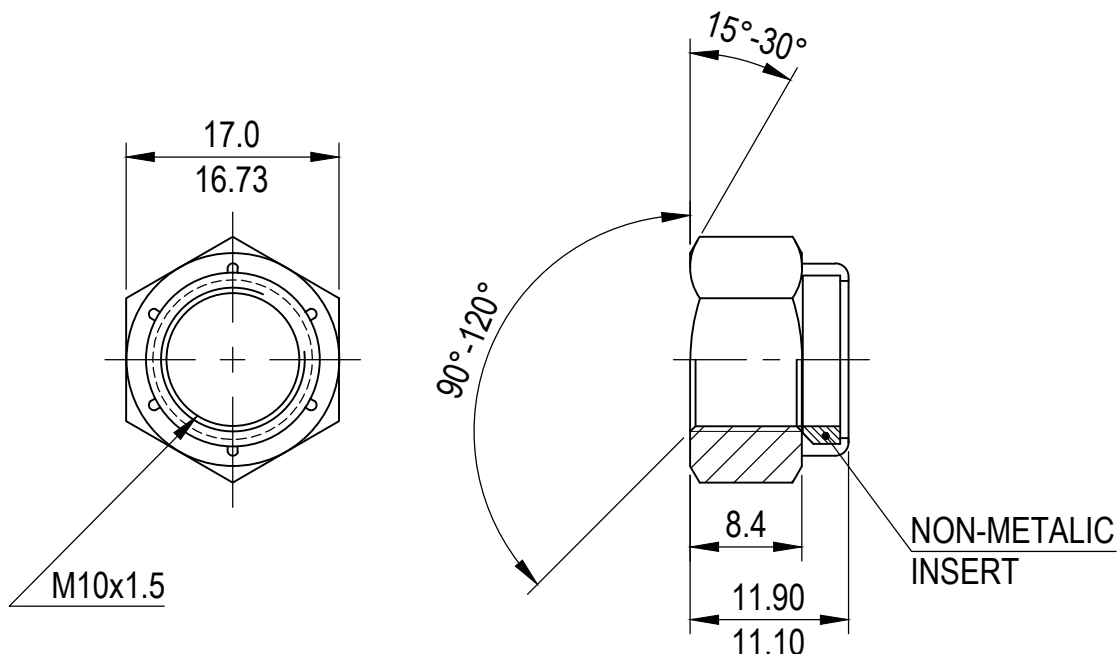
Technical drawing of a shaft assembly. The drawing shows a shaft with a total length of 184 $^{+0}_{-0.792}$. The shaft has a diameter of $\phi 9.52$ $^{+0}_{-0.0508}$ in the main section. The left end features a knurl with a diameter of $\phi 16$ and a width of 19.05. The knurl has a pitch of 3 and a radius of R0.8. The shaft is undercut to $\phi 11$ at the knurl base. The right end has a diameter of $\phi 13$ $^{+0.0508}_{-0}$ and a length of 32 $^{+1.58}_{-0}$. The shaft is threaded M10 at the right end with a 1x45° chamfer. A note indicates: OVER STRAIGHT TOOTH KNURL, 21 PITCH REQUIRED.

1. MACHINE ALL OVER.





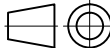
NOMNX(59)/32/2025-HEP-TAM21300 (Computer No. 175406)
eOffice by Mail Order Number (RBP)-MNX355805HEP-TAM21300 (Computer No. 175406) on 25/04/2025 10:02 am

ALL DIMENSIONS ARE IN mm.

REV.	DATE	ALTERED	REV.	DATE	ALTERED	ADDITIONAL INFORMATION : REF.DRG.NO. : -
		CHECKED			CHECKED	
		APPROVED			APPROVED	
ZONE			ZONE			STATUS OF DRAWING :
						DISTRIBUTION OF PRINTS : TME-1, TAM-3, TNX-1




1. BRASS NUT WITH NON-METALIC INSERT.

REF. DRG. NO.																						
			SEE NOTE-1		001		BRASS NUT SELF LOCK							AA12116		KG		—				
																		—				
	59	64	65	75	25	27	29	58	59	29	31	34	45	55	56	57	58	UNIT WT.	65			
INVENTORY NO. SIGN. & DATE	VAR 00		REMARKS			ITEM NO.		DESCRIPTION					STD		IT.NO.		MATL. CODE		A C		UNIT	
													32		33		46		54		68	
													VAR.		MATL. SPCN.						QTY.	
													NAME		SIGN		DATE		NO. OF VAR.			
	BHARAT HEAVY ELECTRICALS LTD. BHOPAL										DRN.		S.D.B.				15.02.16		—			
											CHD.		J.K.				15.02.16					
											APPD.		J.K.				15.02.16					
	DEPT. TIME CODE 405		UNTO. DIMS. GR.						SCALE NTS		WEIGHT (K.G.) —		REF. TO ASSY. DRG. 1 430 23 76 001				ITEM NO. 011		NO. OF ITEM 001			
TITLE BRASS NUT - M10 (SELF LOCKING) TA9901AZ										DRAWING NO. 4 430 23 76 006						REV. 00						
										SHEET NO. 01				NO. OF SHEET 01								

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		CORPORATE STANDARD		AA7151145	
				Rev. No.07	
				PAGE 1 of 3	
THIN NUTS, HEXAGON, PRODUCT Gr: A COARSE PITCH, BRASS (M1.6 - M16)					
1 DESIGNATION					
A product Gr. A hexagon, brass thin nut, nominal diameter 4mm, coarse pitch shall be designated as					
1.1 On drawings					
i) Material specification column : AA7151145					
ii) Description column : THIN NUT HEX A M4 - BR					
1.2 On indents					
Thin Nut Hex A M4 - Brass; AA7151145					
1.3 For issuing enquiries and on purchase orders					
While issuing enquiries and purchase orders, enclose a copy of this BHEL standard.					
2 COMPLIANCE WITH STANDARDS					
2.1 Dimensions, Tolerances & General Requirements					
As per BHEL standard AA7151145					
2.2 Material					
Brass with minimum tensile strength 395 N/mm ² (395 MPa) as specified in IS 319, Gr.1 or Gr.2, Half hard (HB)					
2.2.1 These items are to be manufactured from extruded / drawn sections only.					
2.3 Threads					
Pitch - coarse to IS 4218, Part 2					
Tolerance quality - Medium					
Tolerance class - 6H					
2.4 Identification Marking					
As stated in clause 10 of IS 1367 : Part 6					
2.5 Surface Discontinuity					
As per IS 1367, Part 9 /Sec 1, for General Application.					
IS 1367, Part 9 /Sec 2, for Special Application.					
2.6 Finish					
As specified in BHEL order.					
Revisions:			APPROVED:		
			INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC(F)		
Rev. No.07	Amd. No.	Reaffirmed	Prepared	Issued	Dt. of 1 st Issue
Dt:22-03-2021	Dt:	Year: 20	HEEP, Haridwar	Corp. R&D	01-01-1977

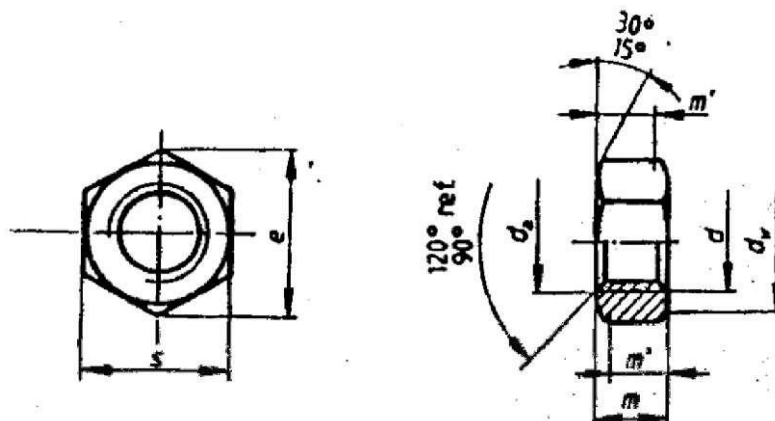


CORPORATE STANDARD

AA7151145

Rev. No.07

PAGE 3 of 3



Note:

- 1) Corporate sub-code Numbers are given in the Table-1
- 2) Weights have been shown in kg per 1000 Nos.

Table 1

All dimensions are in mm

Thread d	Flats s		Corner e Min.	Thickness m		Wrench Height m' Min.	Dia. dw Min.	Dia. da		Sub-code weight
	Max.	Min.		Max.	Min.			Max.	Min.	
M 1.6	3.2	3.02	3.41	1	0.75	0.6	2.1	1.84	1.6	080
M 2	4	3.82	4.32	1.2	0.95	0.8	3.1	2.3	2	098
M 2.5	5	4.82	5.45	1.6	1.35	1.1	4.1	2.9	2.5	101
M 3	5.5	5.32	6.01	1.8	1.55	1.2	4.6	3.45	3	110
M 4	7	6.78	7.66	2.2	1.95	1.6	5.9	4.6	4	012 0.55
M 5	8	7.78	8.79	2.7	2.45	2	6.9	5.75	5	020 0.83
M 6	10	9.78	11.05	3.2	2.9	2.3	8.9	6.75	6	039 1.46
M 8	13	12.73	14.38	4	3.7	3	11.6	8.75	8	047 3.55
M 10	16	15.73	17.77	5	4.7	3.8	14.6	10.8	10	055 7.82
M 12	18	17.73	20.33	6	5.7	4.6	16.6	13	12	063 12.93
M 16	24	23.67	26.75	8	7.42	5.9	22.5	17.3	16	071 22.10



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AA7161002

Rev. No. 04

PAGE 2 of 3

CORPORATE STANDARD

3.6 When fasteners are to be tested with in BHEL, the following sampling plan based on IS: 6821 (Table-1), shall be followed for physical properties.

LOT SIZE	SAMPLE SIZE	ACCEPTANCE NO
Up to 1000	5	0
1001 - 3000	8	0
3001 - 10000	13	0
10001 - 35000	20	0
Over 35000	32	1

4 REFERRED STANDARDS (Latest publications including amendment)

- 1) IS 6821
- 2) AA0230408
- 3) AA7161001
- 4) AA7161004

EXPLANATORY NOTE

The following changes have been made in this revision:

- Clause 2.1, year of reaffirmation is added as IS: 2016-1967, Table-1, Reaffirmed 2011.
- Page-3: Table-1; Sub-code against nominal size 2.7 mm is added.

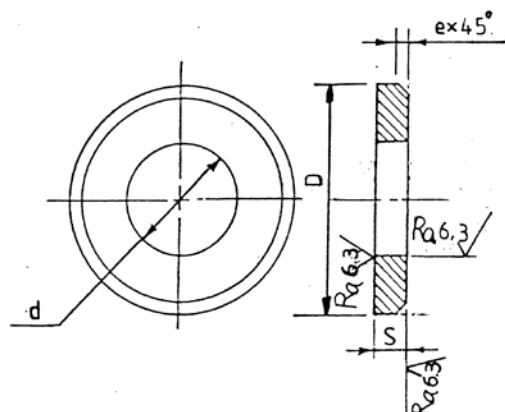


CORPORATE STANDARD

AA7161002

Rev. No. 04

PAGE 3 of 3



NOTE:


- 1) Corporate sub-code numbers are shown below.
- 2) Weights have been shown in kg. / 1000 No.

Table 1

All dimensions are in mm

SIZE NOM. d H12	OUTSIDE DIAMETER (D)		THICKNESS (s)		e Nom.	FOR BOLT OR SCREWS SIZE	Sub – Code Weight
	BASIC	TOL	BASIC	TOL			
1.7	4	+0 -0.3	0.3	± 0.1	0.1	M1.6	
2.2	5	+0 -0.3	0.3	± 0.1	0.1	M2	
2.7	6.5	+0 -0.3	0.5	± 0.1	0.2	M2.5	125
3.2	7	+0 -0.3	0.5	± 0.1	0.2	M3	010 0.12
4.3	9	+0 -0.3	0.8	± 0.1	0.3	M4	028 0.31
5.3	10	+0 -0.3	1.0	± 0.1	0.4	M5	036 0.45
6.4	12.5	+0 -0.4	1.6	± 0.2	0.6	M6	044 1.15
8.4	17	+0 -0.4	1.6	± 0.2	0.6	M8	052 2.22
10.5	21	+0 -0.5	2	± 0.2	0.6	M10	060 4.26
13	24	+0 -0.5	2.5	±0.3	0.6	M12	079 6.69
17	30	+0 -0.5	3	± 0.3	0.6	M16	087 11.90
21	37	+0 -0.8	3	± 0.3	1.0	M20	095
25	44	+0 -0.8	4	± 0.3	1.0	M24	109
31	56	+0 -1.0	4	± 0.3	1.0	M30	
37	66	+0 -1.0	5	± 0.6	1.6	M36	117
43	78	+0 -1.0	7	± 1.0	1.6	M42	
50	92	+0 -1.5	8	± 1.0	1.6	M48	
58	105	+0 -1.5	9	± 1.0	1.6	M56	
66	115	+0 -1.5	9	± 1.0	2.0	M64	
74	125	+0 -1.8	10.0	± 1.0	2.0	M72	
82	140	+0 -1.8	12.0	±1.2	2.5	M80	
93	160	+0 -1.8	12.0	±1.2	3.0	M90	
104	175	+0 -1.8	14.0	±1.2	3.0	M100	
114	185	+0 -2	14	±1.2	3.0	M110	
129	220	+0 -2	16	±1.2	3.0	M125	
144	240	+0 -2	18	±1.2	4.0	M140	

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	CORPORATE STANDARD			AA7164001		
				Rev. No. 05		
				PAGE 1 of 3		
WASHERS, SPRING LOCK, SINGLE COIL, RECTANGULAR SECTION, TYPE - A (WITH BENT ENDS) STEEL						
1 DESIGNATION						
A single coil, rectangular section, spring lock washer, Type-A (with bent ends) for right hand threads, of nominal size 5 mm, and made of steel shall be designated as:						
1.1 On Drawings						
i) Material specification column: AA7164001						
ii) Description column: WASHER SPRING LOCK SC A 5-ST						
1.2 On Indents						
Washer Spring Lock A 5- AA7164001						
1.3 For issuing enquiries and on purchase orders						
While issuing enquiries and purchase orders, delete the corporate standard No, from the above description and add the information given under clause 2.						
2 COMPLIANCE WITH STANDARDS						
2.1 Dimensions, Tolerances & General Requirements						
To IS 3063-1994, Type A (Table-1A) Reaffirmed 2010						
2.2 Material						
Spring steel Gr. 3 to Gr.6 as specified in IS 4072						
2.3 Heat Treatment and Hardness						
Spring Lock washer after coiling shall be suitably heat treated, so as to result in the finished washer having a hardness in the range of 430 - 530 HV						
2.4 Finish						
As specified in BHEL order.						
Revisions: As per clause 33.5.a) of MOM of MRC-Fasteners				APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE – MRC (F)		
Rev. No. 05	Amd. No.	Reaffirmed	Prepared	Issued	Dt. of 1 st Issue	
Dt: 14-03-2016	Dt:	Year: 20	HPEP, Hyderabad	Corp. R&D	01-04-1993	

AA7164001

Rev. No. 05

PAGE 2 of 3

CORPORATE STANDARD**3 NOTE**

- 3.1** For washers spring lock (Type-B) refer corporate standard AA7164002.
- 3.2** Lock washers to this standard would be un-plated, divisions wishing to have plated washers would have to get them plated.
- 3.3** Weights given in this standard are for general reference only and are not meant for commercial transactions.
- 3.4** When the fasteners are to be tested within BHEL, the following sampling plan shall be followed for physical properties.

LOT SIZE	SAMPLE SIZE	ACCEPTANCE No.
Up to 1000	5	0
1001 – 3000	8	0
3001 - 10000	13	0
10000 – 35000	20	0
Over 35000	32	1

4 Referred Standards (Latest Publications including amendments)

- 1) AA7164002
- 2) IS 4072

EXPLANATORY NOTE

The following changes have been made in this revision:

- Clause 2.1, year of Reaffirmation of **IS** changed as IS 3063-1994, Reaffirmed 2010

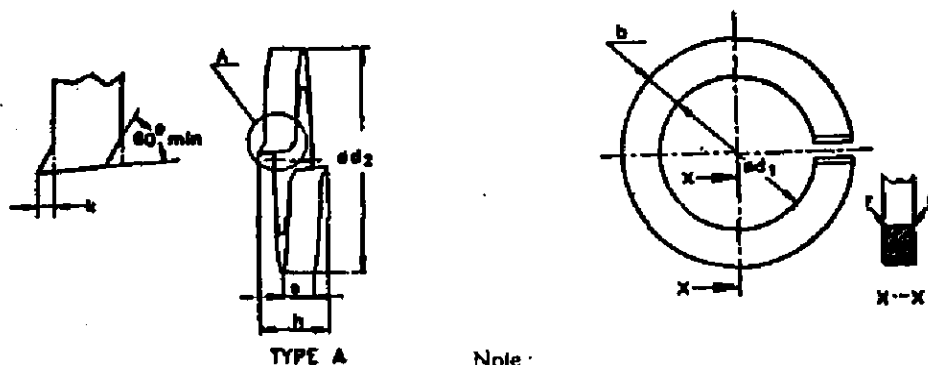


CORPORATE STANDARD

AA7164001

Rev. No. 05

PAGE 3 of 3



$$b = 2s + 2k$$

Note :

1. Corporate sub-code Numbers only are shown in Table 1
2. Weights have been shown in kg per 1000 No.

Table 1

All dimensions are in 'mm'

Nom. size	Internal Diameter d ₁		Outside Dia d ₂ Max.	Width b		Thickness s		Radius r Nom.	Bent End k*	For Bolt Nut or Screw Size	Sub code	Weight
	Basic	Tol. +		Basic	Tol. ±	Basic	Tol. ±					
2	2.1	0.3	4.4	0.9	0.1	0.5	0.1	0.1	-	M2		0.033
2.2	2.3	0.3	4.8	1.0	0.1	0.6	0.1	0.1	-	M2.2		0.050
2.5	2.6	0.3	5.1	1.0	0.1	0.6	0.1	0.1	-	M2.5		0.052
3.0	3.1	0.3	6.2	1.3	0.1	0.8	0.1	0.2	0.15	M3	014	0.11
4.0	4.1	0.3	7.6	1.5	0.1	0.9	0.1	0.2	0.15	M4	022	0.18
5.0	5.1	0.3	9.2	1.8	0.1	1.2	0.1	0.2	0.15	M5	030	0.36
6.0	6.1	0.4	11.8	2.5	0.15	1.6	0.1	0.3	0.2	M6	049	0.83
8.0	8.1	0.4	14.8	3.0	0.15	2.0	0.1	0.5	0.3	M8	057	1.60
10.0	10.2	0.5	18.1	3.5	0.2	2.2	0.15	0.5	0.3	M10	065	2.53
12.0	12.2	0.5	21.1	4.0	0.2	2.5	0.15	1.0	0.4	M12	073	3.82
16.0	16.2	0.8	27.4	5.0	0.2	3.5	0.2	1.0	0.4	M16	081	8.91
20.0	20.2	1.0	33.6	6.0	0.2	4.0	0.2	1.0	0.4	M20	090	15.2
24.0	24.5	1.0	40.0	7.0	0.25	5.0	0.2	1.6	0.5	M24	103	26.2
30.0	30.5	1.2	48.2	8.0	0.25	6.0	0.2	1.6	0.8	M30	111	44.3
36.0	36.5	1.2	58.2	10.0	0.25	6.0	0.2	1.6	0.8	M36		67.3
42.0	42.5	1.2	68.2	12.0	0.25	7.0	0.25	2.0	0.8	M42		111
48.0	49.0	1.5	75.0	12.0	0.25	7.0	0.25	2.0	0.8	M48		123
52.0	53.0	1.5	83.0	14.0	0.25	8.0	0.25	2.0	1	M52		182
56.0	57.0	1.5	87.0	14.0	0.25	8.0	0.25	2.0	1	M56		193
60.0	61.0	1.5	91.0	14.0	0.25	8.0	0.25	2.0	1	M60		203
64.0	65.0	1.5	95.0	14.0	0.25	8.0	0.25	2.0	1	M64	120	218

The bend "k" shall be made on the last length of the washer circumference without any sharp angle.