

 ENQUIRY TWO PART BID BPC 0007 E-TENDER	भारत हेवी इलेक्ट्रिकल्स लिमिटेड, पिपलानी, भोपाल- ४६२०२२ (भारत) सामग्री प्रबंधन विभाग BHARAT HEAVY ELECTRICALS LIMITED, PIPLANI, BHOPAL-462022 (INDIA) MATERIALS MANAGEMENT DIVISION		ENQUIRY NO E5953038 ENQUIRY DATE 12/09/25 ENQUIRY DUE DATE 22/09/25
	TIN NO- 23573000001 ECC NO- AAACB4146PXM009 MPCT NO- HEL/05/01/0001/S15/11/79 PHONE NO : 91-755-2500100 FAX : 91-755-2500023 www.bhel.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
	0	1	0	NA	2	4	2	121354558
	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 AT BHEL BHOPAL.				

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	QTY VR%	LOT NO	LOT QTY	DEST	DELIVERY DATE
1	BP9044826859	TA7009AZ FLEXIBLE SHUNT ASSY TO DRG NO. 34304573005 V00 REV"01". TO BE SUPPLIED IN PROPER PACKING.	NO	80.000	30	1	40.000	213	06/11/25
						2	40.000	213	06/12/25
2	BP9044826867	TA7009AZ FLEXIBLE SHUNT ASSY TO DRG NO. 34304573005 V01 REV"01". TO BE SUPPLIED IN PROPER PACKING.	NO	40.000	30	1	20.000	213	06/11/25
						2	20.000	213	06/12/25

REMARK FOR DETAILS REFER TO NIT FLOATED AT NIC PORTAL

DRAWING	Y	PURCH SPEC	Y	CATALOUGE	N	Quality Surveillance Plan	N	TWO PART BID	Y
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NOTE: BHEL, BHOPAL'S Standard Terms & Conditions BP200102 (Latest Revision) form a part of this Enquiry. Bidders may obtain from us copies of these terms and conditions if not already available.

Note: During Bid Evaluation, No loading of price with regard to preferential payment of within 45 days will be made on vendore falling under MSMED ACT - OCT 06

Please submit your lowest quotation in sealed envelop essentially superscribed with ENQUIRY NO, DUE DATE AND PARTY'S NAME so as to reach at TENDER ROOM, GROUND FLOOR, ADM BUILDING, BHEL, PIPLANI BHOPAL-462022 by 11.00 am of due date.

1. This is only a request for Quotation & not an order.
2. Small Scale industries should indicate SSI Regn. No. in Quotation/invoice.
3. In case you are not making an offer against this Enquiry, we request you to post a regret letter.
4. Indian vendors to please indicate GSTIN on their quotation.

SPECIAL REMARK: Bid to be submitted through e-procurement. Refer eproc link on BHEL Bhopal B2B site.

Documents Enclosed

1. Drawing.
2. Catalogue.
3. Purchase specification.
4. Quality Surveillance Plan.

NAME : SHRI MANENDRA SINGH

DESG : DY.MANAGER

0755-2505880

manendra1@bhel.in

SIGN & SEAL



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

BHEL ENQUIRY NO. E5953038
DUE ON 22-09-2025

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. Purchase Ordering shall be done as per BHEL requirement against the finalised rate contract & within its validity. Dispatches to be made against our purchase order (computerized) only, which will be issued against this Rate Contract. BHEL reserves the right to cancel/ short close the Rate Contract for unordered qty at any point of time even before the expiry of RC validity without assigning any reason whatsoever it may be.
2.	ITEM DESCRIPTION	Item01: - TA7009AZ FLEXIBLE SHUNT ASSY TO DRG NO. 34304573005 V00 REV"01". TO BE SUPPLIED IN PROPER PACKING. Item02: - TA7009AZ FLEXIBLE SHUNT ASSY TO DRG NO. 34304573005 V01 REV"01". TO BE SUPPLIED IN PROPER PACKING.
3.	TECHNICAL CONDITION	As per attached list of attached Drawings & Spec.
4.	QUANTITY	Item01:- 80 nos Item02:- 40 nos
5.	QUANTITY VARIATION	± 30% for each item
6.	SPLITTING OF ORDER	Not Applicable
7.	DELIVERY SCHEDULE REQUIREMENT	For the 1st lot of 40 Nos for item 01 & 20 Nos for item 02 scheduled delivery date shall be within 60 days from the PO date and thereafter for each subsequent lot of 40 Nos for item 01 & 20 Nos for item 02 scheduled delivery date shall be within 30 days from the scheduled delivery date of the previous lot. Early delivery acceptable.
8.	DELIVERY TERMS	FOR Destination (BHEL Bhopal)
9.	DELIVERY INSTRUCTION	Supplier identification (viz. Vendor code, PO number, sn etc) is must.
10.	QAP	Not Applicable.
11.	INSPECTION CONDITION	Inspection at BHEL
12.	SAMPLE	As per attached Drg, Spec (As applicable)
13.	TEST CERTIFICATE	All Material TC to be supplied along with material as per drg Spec. and TC should incorporate Spec.
14.	GUARANTEE / WARRANTY	As per BHEL GTC of ENQUIRY (BP200102B, Cl. No. 18)
15.	GUARANTEE/ WARRANTEE CERTIFICATE	GUARANTEE/ WARRANTEE Certificate to be supplied along with each lot of the material.



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HEAVY ELECTRICAL PLANT, BHOPAL

BHARAT HEAVY ELECTRICALS LIMITED

BHEL ENQUIRY NO. E5953038

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16.	INVOICE & DOCUMENTS SUBMISSION FOR PAYMENT.	<p>For supply orders placed on Indian Suppliers: Irrespective of the value of the invoice amount, the bidder / vendor should necessarily upload the despatch & invoice details on BHEL SUVIDHA portal at https://suvidha.bhel.in/suvidha/, prior to despatch. All documents as per PO checklist, along with additional documents (if any), must be uploaded on the portal. It is mandatory that tax invoices with a net amount (including taxes) exceeding Rs five lakhs uploaded on the portal are digitally signed using a Class 3 Digital Signature Certificate (DSC) issued by a licensed Certifying Authority. Submission of invoice document in hard copy is allowed for invoices with a net amount (including taxes) equal to and upto Rs five lakhs, in case they were not digitally signed and uploaded on the portal.</p> <p>The material will not be accepted inside BHEL in absence of the above.</p>
17.	PAYMENT TERMS	<p>As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 16)</p> <p>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.</p> <p>Any deviation from the above payment terms, if accepted (by BHEL), shall be loaded @ SBI base rate + 6% for the purpose of bid evaluation.</p>
18.	TECHNICAL PQR (T-PQR)	<p>Technical Pre-Qualification Requirements (T-PQR) for procurement of the items is attached with the NIT.</p> <p>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.</p> <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>
19.	FINANCIAL PQR (F-PQR)	<p><i>Not Applicable.</i></p>
20.	BID PARTS	<p>Offer shall be submitted by the bidders in Two Parts, i.e. Part-I Technical cum Commercial bid & Part-II Price bid.</p>
21.	PENALTY / LD	<p>As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 9)</p> <p>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.</p>
22.	PRICE BASIS	<p>Firm Price basis</p>
23.	PRICING TERMS	<p>As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 12)</p>
24.	PRICE VALIDITY	<p>As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 13)</p> <p>i.e. Offer shall be valid for a period of 90 days from the date of Techno- commercial (Part-I) bid opening date.</p>
25.	TAXES & DUTIES	<p>As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 14)</p>
26.	EVALUATION CRITERIA	<p>Overall L1 basis.</p>

**MATERIAL MANAGEMENT - TRACTION MACHINES****HEAVY ELECTRICAL PLANT, BHOPAL****BHARAT HEAVY ELECTRICALS LIMITED****BHEL ENQUIRY NO. E5953038****DUE ON 22-09-2025**

27.	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>
28.	BID SECURITY/ Earnest Money Deposit (EMD)	Not Applicable
29.	PERFORMANCE SECURITY (PBG)	Not Applicable.
30.	REVERSE AUCTION	Not Applicable.
31.	MSE PREFERENCE	Applicable as per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 29)
32.	PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA)	Not Applicable.
33.	INTEGRITY PACT (IP)	Not Applicable.
34.	RESTRICTION UNDER RULE 144 (xi) GFR	As per attached BHEL GTC of ENQUIRY (BP200102B, Cl. No. 34)
35.	CONFLICT OF INTEREST AMONG BIDDERS/ AGENTS AND THEIR DECLARATION	<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.</p> <p>Bidders having a conflict of interest shall not be eligible to participate in the tender process.</p> <p>Treatment of cases regarding conflict of interest: -</p> <p>The bidder notes that a conflict of interest would said to have occurred in the tender process and execution of the resultant contract, in case of any of the following situations: -</p> <ul style="list-style-type: none">i) If its personnel have a close personal, financial, or business relationship with any personnel of BHEL who are directly or indirectly related to the procurement or execution process of the contract, which can affect the decision of BHEL directly or indirectly;ii) The bidder (or his allied firm) provided services for the need assessment/ procurement planning of the Tender process in which it is participating;iii) Procurement of goods directly from the manufacturers /suppliers shall be preferred. However, if the OEM/ Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the



MATERIAL MANAGEMENT - TRACTION MACHINES

HEAVY ELECTRICAL PLANT, BHOPAL

BHARAT HEAVY ELECTRICALS LIMITED

BHEL ENQUIRY NO. E5953038

DUE ON 22-09-2025

		<p>manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. In case bids are received from both the manufacturer/ supplier and the agent, bid received from the agent shall be ignored. However, this shall not debar more than one Authorised distributor (with/ or without the OEM) from quoting equipment manufactured by an Original Equipment Manufacturer (OEM) in procurements under a Proprietary Article Certificate.</p> <p>iv) A bidder participates in more than one bid in this tender process. Participation in any capacity by a Bidder (including the participation of a Bidder as a partner/ JV member or sub-contractor in another bid or vice-versa) in more than one bid shall result in the disqualification of all bids in which he is a party. However, this does not limit the participation of an entity as a sub-contractor in more than one bid if he is not bidding independently in his own name or as a member of a JV.</p> <p>The Bidder declares that they have read and understood the above aspects, and the bidder confirms that such conflict of interest does not exist and undertakes that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s), in this regard. 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. In case, the Bidder is found having indulged in above activities, the same will be considered as a violation of the tender conditions, and suitable action shall be taken by BHEL as per extant policies/ guidelines.</p>
36.	ANNEXURE-IX	<p>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.</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 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>



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HEAVY ELECTRICAL PLANT, BHOPAL
BHARAT HEAVY ELECTRICALS LIMITED

BHEL ENQUIRY NO. E5953038
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		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.
39.	GEM REGISTRATION	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. 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. Hence, you are requested to get yourselves registered on GeM.
40.	TENDER FEE	Not applicable
41.	BID SUBMISSION WITHIN DUE DATE & TIME	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. <i>BHEL reserves the right for extension of tender based on the situation without assigning any reason whatsoever it may be.</i>
42.	DOCUMENTS TO BE FURNISHED ALONG WITH YOUR QUOTATION	Signed and Sealed copy of: <ul style="list-style-type: none">- NIT- BHEL GTC of ENQUIRY (BP200102B)- BHEL PO Terms Duly Filled, Signed and Sealed copy of: <ul style="list-style-type: none">- Techno-Commercial Annexure- T-PQR along with all supporting documents- Annexure-IX in Company Letterhead- Annexure A for OEM & MSE Declaration.- Others: <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 inline with NIT requirement and submit with offer)

Tender No.		E5953038 due on 22/09/2025		
Description :		<p>Item01: - TA7009AZ FLEXIBLE SHUNT ASSY TO DRG NO. 34304573005 V00 REV"01". TO BE SUPPLIED IN PROPER PACKING.</p> <p>Item02: - TA7009AZ FLEXIBLE SHUNT ASSY TO DRG NO. 34304573005 V01 REV"01". TO BE SUPPLIED IN PROPER PACKING.</p> <p>TENDER QTY.:- Item01: - 80 nos +/-30%, Item02: - 40 nos +/-30%.</p> <p>Delivery required as per NIT.</p>		
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 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 inline with NIT requirement and submit with offer)

Tender No.		E5953038 due on 22/09/2025		
Description :		<p>Item01: - TA7009AZ FLEXIBLE SHUNT ASSY TO DRG NO. 34304573005 V00 REV"01". TO BE SUPPLIED IN PROPER PACKING.</p> <p>Item02: - TA7009AZ FLEXIBLE SHUNT ASSY TO DRG NO. 34304573005 V01 REV"01". TO BE SUPPLIED IN PROPER PACKING.</p> <p>TENDER QTY.:- Item01: - 80 nos +/-30%, Item02: - 40 nos +/-30%.</p> <p>Delivery required as per NIT.</p>		
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/not applicable		
27	Details of location of value addition / manufacturing	As per supplier/not applicable		
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 has been submitted	Yes / No		
31	Acceptance to "REVERSE AUCTION" if conducted (As per BHEL's RA policy)	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	



BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
TRACTION MACHINES ENGINEERING DIVISION

Dated: 13.03.25

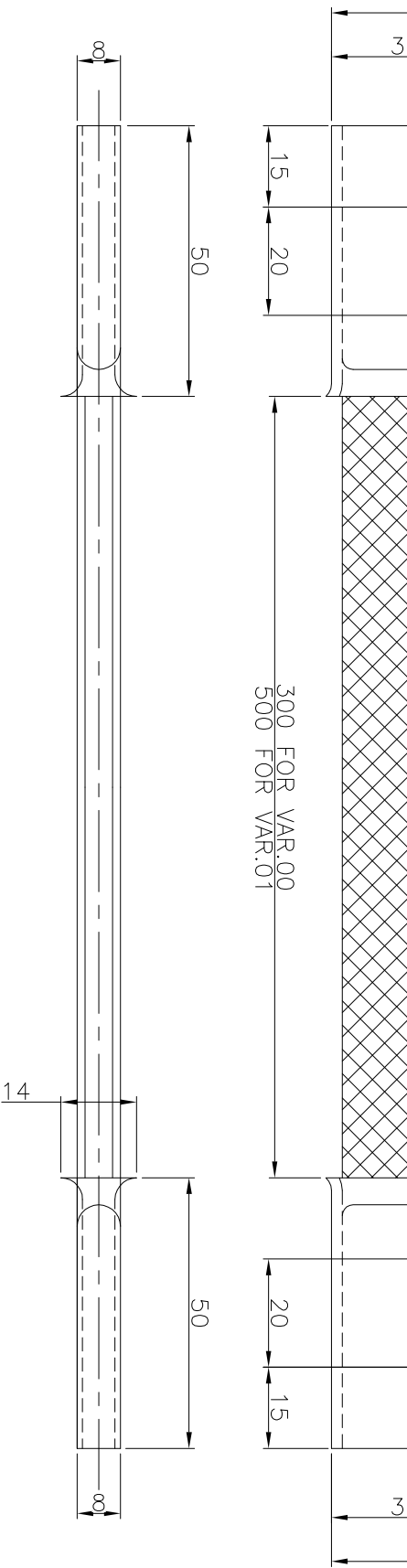
Technical requirement of Flexible Shunt Item is as under:

Cl. No.	Description	Vendor to comment	
		Complied / Not complied	Supporting relevant document to be submitted
1	Flexible shunt assembly to be as per BHEL drawing.	Yes/No	Deviation not accepted
2.	Manufacturing / supply experience in preceding 5 years (from tender opening date) for same or similar item* is required.	Yes/No	Unpriced PO copies, corresponding Challan/Invoice required.

Note:

1. *Copper Connectors made up of flexible copper braiding shall be considered as similar item.
2. Compliance of all the points in above PQR is mandatory. In absence of compliance of above, vendor's offer is liable to be rejected.

Prepared by



004	—			003	FLEXIBLE CU. BRAID 500 MM LONG							
002	002			002	FERRULE							
—	004			001	FLEXIBLE CU. BRAID 300 MM LONG							
QTY VAR 01	59	QTY VAR 00	64	REMARKS	65	VAR. NO.	78 79 25 27 29	DESCRIPTION	58	STD	59	60

REF. DRG. NO.										SIGN. & DATE										INVENTORY NO.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
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CORPORATE PURCHASING SPECIFICATION

AA 120 10

Rev. No. 03

PAGE 1 OF 4

FLEXIBLE COPPER BRAID – ANNEALED, FLAT

1.0 GENERAL:

This specification governs the quality requirements of flat flexible copper braid in annealed condition, manufactured from high conductivity copper wire, plaited in a tubular form.

2.0 APPLICATION:

Used in the manufacture of flexible connections of electrical apparatus.

3.0 CONDITION OF DELIVERY:

Copper braid shall be supplied in flat flexible annealed condition. The braid shall be of ordinary flexible quality or stretch wires refer Cl.6.3.

4.0 COMPLIANCE WITH NATIONAL STANDARDS:

There is no Indian Standard covering this material.

5.0 DIMENSIONS AND TOLERANCES:

5.1 Sizes:

The Copper braid shall be supplied with the width and thickness as specified in BHEL order. The stranding of the preferred sizes are given below:

Thickness mm	Width mm	No of strands	Wire dia mm	No of braids	Effective area, cm ²
1.60	19.05	648	0.122	1	0.1174
3.20	25.40	1908	0.152	3	0.4355

The stranding of other sizes shall be as described in BHEL order

5.2 Tolerances:

5.2.1 Width & Thickness:

The tolerance on width and thickness shall be ± 0.381 mm measured on the braid under no compression or tension.

Revisions :

Clause:20.10.9 of MOM of MRC-NFCW+HE

APPROVED :

INTERPLANT MATERIAL RATIONALISATION
COMMITTEE-MRC (NFCW+HE)

Rev. No. 03

Amd.No.

Reaffirmed

Prepared

Issued

Dt. of 1st Issue

Dt :15.02.2006

Dt :

Year :2012

BHOPAL

Corp. R&D

November, 1978

AA 120 10

Rev. No. 03

PAGE 2 OF 4

CORPORATE PURCHASING SPECIFICATION



5.2.2 Wire:

The tolerance on wire diameter shall be as follows:

Nominal Over	Diameter mm upto & incld.	Tolerance (±)
--	0.127	0.0025
0.127	0.190	0.0051

6.0 MANUFACTURE:

6.1 The wires for the braid shall be manufactured from copper of ETP grade conforming to IS:191.

6.2 **Braiding:** The stands shall be divided into groups of equal number and braided in tubular form. The braid shall then be flattened. The lay of the braid side shall, at the supplier's discretion, meet the flexibility and dimensional details specified.

For large number of strands the braids may be manufactured in two or more concentric tubular forms.

6.3 **Stretch wires:** Whenever specified in BHEL order, the braid shall be supplied with two parallel stretch wires of large diameter than the wire used in the braid running the whole length of the braid, to assist in controlling the width during manufacture and excessive stretching.

7.0 FREEDOM FROM DEFECTS:

The braid shall be clean, and free from harmful harmful defects.

8.0 CHEMICAL ANALYSIS:

The analysis of copper when analyzed in accordance with IS:440, shall as follows.

Element	Percent	
	Min.	Max
Copper and Silver	99.90	-----
Bismuth*	-----	0.001
Lead*	-----	0.005
Total of all impurities excl. silver and oxygen	-----	0.030
Silver present will be counted as copper.		



CORPORATE PURCHASING SPECIFICATION

AA 120 10

Rev. No. 03

PAGE 3 OF 4

*These elements need not be determined when the material supplied conforms with mechanical and electrical properties specified in this specification. However, the supplier shall ensure that the composition of the material lies within the limits specified above.

9.0 TEST SAMPLES

One sample per size per melt per consignment of 3 tonnes or part thereof shall be taken for chemical and electrical tests.

The sample shall be cut off cold and shall receive no further treatment before being tested.

10.0 ELECTRICAL RESISTIVITY (AS RECEIVED)

When measured in accordance with IS: 3635, the electrical resistivity at 20⁰.C shall not be greater than 0.01739 ohm-mm²/metre, which is equivalent to an electrical conductivity of 99.14%, minimum of IACS standard. (Refer Appendix B of IS: 613 for temperature correction factor).

11.0 INSPECTION AT SUPPLIER ' WORKS:

When ever specified tests and inspection are to be conducted in the presence of BHEL's representative.

The supplier shall offer BHEL's representative all reasonable facilities, without charge to Satisfy the latter that the material is being furnished in accordance with this specification. The supplier shall prepare and provide necessary test specimens for testing to be carried out at his premises. If facilities are not available at his works, the supplier shall make Necessary arrangements for carrying out the prescribed test elsewhere. The supplier shall Notify BHEL in advance about the readiness of the material for inspection and testing.

BHEL reserves the right to test the material at BHEL's works and the final acceptance of the material shall be based on these test results.

12.0 TEST CERTIFICATES:

Unless other wise stated, three copies of certificates shall be supplied along with each consignment.

In addition, the supplier shall ensure to send one copy of test certificates along with the dispatch documents to facilitate quick clearance of the material.

AA 120 10	CORPORATE PURCHASING SPECIFICATION	
Rev. No. 03		
PAGE 4 OF 4		

The test certificate shall bear the following information:

AA 12010 (Rev.03) : Flexible Copper Braid - Annealed, Flat

BHEL Order No.

Manufacturer 's/Supplier's Name:

Lot/Identification/Batch/Melt No.

Sizes and Quantity Supplied

The effective cross sectional area of the braid in square cm calculated from $W/o.887$ where W is the weight of finished braid in kg per metre length.

Results of dimensional inspection, chemical analysis, mechanical and electrical tests as per this specification.

13.0 PACKING AND MARKING:

The material shall be suitably packed to prevent damage during transit.
Each package shall be legibly marked or labeled with the following information:

AA 12010 : Flexible Copper braid – Annealed, Flat

BHEL Order No.

Manufacturer's/Supplier's Name :

Lot/Identification/Batch/Melt No.

Sizes and Quantity Supplied


14.0 REFERRED STANDARDS (Latest Publications Including Amendments):

1. IS: 191

2. IS:440

3. IS: 613

4. IS: 3635

	CORPORATE PURCHASING SPECIFICATION		AA 120 17		
			Rev. No. 02		
			PAGE 1 OF 5		
OXYGEN FREE HIGH CONDUCTIVITY COPPER TUBES - MEDIUM HARD					
1.0 GENERAL: This specification governs the quality requirements of oxygen free high conductivity copper tube, solid drawn Square/ Rectangular/Circular/ in medium hard condition.					
2.0 APPLICATION: Used in switchgear, transformers and traction motors.					
3.0 CONDITION OF DELIVERY: The material shall be supplied in medium hard condition in straight lengths as specified in BHEL order. Ends shall be cut clean and square with the axis of the tube.					
4.0 COMPLIANCE WITH NATIONAL STANDARDS: There is no Indian Standard covering this material. However, assistance has been drawn from the following national standard. BS: 1977-1976 : Specification for High Conductivity Gr : C 103 Copper Tubes for Electrical Purposes. Medium hard					
5.0 DIMENSIONS AND TOLERANCES:					
5.1 Sizes: The tubes shall be supplied to the dimensions as specified in BHEL order.					
5.2 Tolerances:					
5.2.1 Thickness: Tolerance on thickness shall be as follows:					

Thickness, mm		Tolerance, + mm			

Over	upto & incl.				

0.75	1.60	0.15			
1.60	2.25	0.20			
2.25	4.30	0.35			
4.80	7.00	0.45			
7.00	9.50	0.60			
9.50	15.00	0.80			
15.00	25.00	1.00			

Revisions: Ref: CL31.2.1 of MOM of MRC –E & 15.27 of MRC-NFCW+HE			APPROVED: INTERPLANT MATERIAL RATIONALISATION COMMITTEE-MRC (NFCW +HE)		
Rev. No. 02	Amd.No. 01	Reaffirmed	Prepared HYDERABAD	Issued Corp. R&D	Dt. Of 1 st Issue 01-11-78
Dt.: 01-02-97	Dt: 01-05-99	Year:			

AA 120 17	CORPORATE PURCHASING SPECIFICATION	
Rev. No. 02		
PAGE 2 OF 5		

5.2.2 Length:

Tolerance on length of the tubes ordered in specified length shall be as follows:

Length, metre		:	Tolerance, ± mm
over	upto & incl.		
--	3.0		1.5
3.0	6.0		3.0

For sizes not included in this specification, tolerance shall be as stated in BHEL order.

5.2.3 Circular Tubes Diameters:

The mean diameter of the tube shall not vary from the specified diameter by more than the amount of tolerance given below. The mean diameter is half the sum of two diameters measured at right angles at any section of the tube.

Nominal Diameter mm		Tolerance mm	
over	up to & incl.	plus	minus
	15	0.0	0.13
15	50	0.0	0.20
50	100	0.0	0.25

5.2.4 Square & Rectangular Tubes:

The tolerances on square and Rectangular tubes shall be as agreed between BHEL and the suppliers.

6.0 MANUFACTURE:

The tubes shall be manufactured from copper of ETP grade conform to IS:191, except that oxygen content shall not exceed 0.001% .


7.0 FREEDOM FROM DEFECTS:


The material shall be clean, bright, smooth and free from spills, scaling, blisters, cracks, lappings, shaving, splinters, metal dust, oxidation and other harmful defects. However, such surface marks caused during drawing or rolling that are barely noticeable to the naked eye are allowed

Ends shall be cut clean and square with the axis of the tube.

8.0 CHEMICAL COMPOSITION:

The analysis of copper when analysed in accordance with IS: 440, shall be as follows.

	CORPORATE PURCHASING SPECIFICATION	AA 120 17																							
		Rev. No. 02																							
		PAGE 3 OF 5																							
<table border="1"> <thead> <tr> <th data-bbox="418 401 1036 499" rowspan="2">Element</th><th colspan="2" data-bbox="1036 401 1203 499">Percent</th></tr> <tr> <th data-bbox="1036 449 1114 499">Min</th><th data-bbox="1203 449 1333 499">Max</th></tr> </thead> <tbody> <tr> <td data-bbox="418 506 1036 548">Copper and Silver</td><td data-bbox="1036 506 1203 548">99.90</td><td data-bbox="1203 506 1333 548"></td></tr> <tr> <td data-bbox="418 548 1036 590">Bismuth *</td><td data-bbox="1036 548 1203 590">-</td><td data-bbox="1203 548 1333 590">0.001</td></tr> <tr> <td data-bbox="418 590 1036 632">Lead *</td><td data-bbox="1036 590 1203 632">-</td><td data-bbox="1203 590 1333 632">0.005</td></tr> <tr> <td data-bbox="418 632 1036 674">Oxygen</td><td data-bbox="1036 632 1203 674">-</td><td data-bbox="1203 632 1333 674">0.001</td></tr> <tr> <td data-bbox="418 674 1036 716">Total of all impurities excl.silver and oxygen</td><td data-bbox="1036 674 1203 716">-</td><td data-bbox="1203 674 1333 716">0.040</td></tr> <tr> <td colspan="3" data-bbox="418 716 1036 758">Silver present will be counted as Copper.</td></tr> </tbody> </table> <p data-bbox="418 779 1430 919">* These elements need not be determined when the material supplied conforms with mechanical and electrical properties specified in this specification. However, the supplier shall ensure that the composition of the material lies within the limits specified above.</p> <p data-bbox="224 947 553 982">9.0 TEST SAMPLES:</p> <p data-bbox="342 982 1430 1115">One sample per size per melt per consignment of 3 tonnes or part thereof shall be taken for chemical, mechanical and electrical tests. The sample shall be cut off cold and shall receive no further treatment before being tested.</p> <p data-bbox="224 1150 773 1186">10.0 MECHANICAL PROPERTIES:</p> <p data-bbox="224 1213 565 1249">10.1 Tensile Strength:</p> <p data-bbox="342 1249 1398 1318">The material when tested in accordance with IS: 1608 shall show a tensile strength of 245 N/mm² Minimum.</p> <p data-bbox="224 1346 594 1381">10.2 Hardness(Vickers):</p> <p data-bbox="342 1381 1365 1451">When tested in accordance with IS: 1501,(Part 1), the material shall have a vickers hardness in the range of 75 - 90 HV.</p> <p data-bbox="224 1478 548 1514">10.3 Hydraulic Test:</p> <p data-bbox="342 1514 1414 1619">The tubes shall withstand, when hydraulically tested to a test pressure of 20 kg/cm² for one hour in water, and shall not show any sign of leakage or sweating or permanent increase in diameter at any point.</p> <p data-bbox="224 1646 967 1682">11.0 ELECTRICAL RESISTIVITY(AS RECEIVED):</p> <p data-bbox="342 1682 1455 1822">When measured in accordance with IS:3635, the electrical resistivity at 20° c shall not be greater than 0.01777 ohm mm²/metre, which is equivalent to an electrical conductivity of 97%, minimum of IACS standard. (Refer Appendix B of IS: 613 for temperature correction factor.)</p> <p data-bbox="342 1822 1455 1892">Alternatively, the method of measurement employing eddy current probes as per ASTM E 1004 shall also be acceptable</p>			Element	Percent		Min	Max	Copper and Silver	99.90		Bismuth *	-	0.001	Lead *	-	0.005	Oxygen	-	0.001	Total of all impurities excl.silver and oxygen	-	0.040	Silver present will be counted as Copper.		
Element	Percent																								
	Min	Max																							
Copper and Silver	99.90																								
Bismuth *	-	0.001																							
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Silver present will be counted as Copper.																									

AA 120 17	CORPORATE PURCHASING SPECIFICATION	
Rev. No. 02		
PAGE 4 OF 5		

12.0 OPTIONAL TESTS:
Whenever specified in BHEL order the following tests shall be conducted on the norms of acceptance shall be as specified there in.


12.1 Hydrogen Embrittlement Test:
The test pieces cut from the tube(either full section or strips from the tubes) is exposed to hydrogen atmosphere at 825°C - 875°C for 30 minutes. After cooling down to room temperature the pieces are tested. In case of full section sample, the tube shall be flattened to close. In case of a strip cut from the tube, it shall be bent 180°. In no case the copper shall exhibit any crack.

12.2 Metallographic Examination:
After subjecting the material to the hydrogen embrittlement test, the test pieces shall be examined under an optical microscope at a magnification of at least 200. Test pieces shall show no fissures or cracks and inclusions, particularly cuprous oxide shall be absent.

12.3 Hydrogen Resistance-Round Tubes:
Tube specimens of 10 to 20 mm length are annealed for 30 minutes at 800 to 850° C in a reduced atmosphere (hydrogen or fuel gas) cooled and then compressed between two parallel platens until the specimen shall not show any incipient cracks or fracture at the bend. In case of thick-walled tubes or tubes of larger cross-section, a strip of about 10 mm wide can be taken as test specimen.

13.0 INSPECTION AT SUPPLIER'S WORKS:
Whenever specified, tests and inspection are to be conducted in the presence of BHEL's representative.
The supplier shall offer BHEL's representative all reasonable facilities, without charge to satisfy the latter that the material is being furnished in accordance with this specification. The supplier shall prepare and provide necessary test specimens' for testing to be carried out at his premises. If facilities are not available at his works, the supplier shall make necessary arrangements for carrying out the prescribed tests elsewhere. The supplier shall notify BHEL in advance about the readiness of the material for inspection and testing. BHEL reserves the right to test the material at BHEL's works and the final acceptance of the material shall be based on these test results.

14.0 TEST CERTIFICATES:
Unless otherwise stated, three copies of certificates shall be supplied along with each consignment.

	<p align="center">CORPORATE PURCHASING SPECIFICATION</p>	<p align="center">AA 120 17</p>
		<p align="center">Rev. No. 02</p>
		<p align="center">PAGE 5 OF 5</p>

In addition, the supplier shall ensure to send one copy of test certificates along with the despatch documents to facilitate quick clearance of the material.

The test certificate shall bear the following information:

AA 12017 (Rev.No.02) : Oxygen Free High Conductivity Copper
 Tube - Medium Hard.

BHEL Order No

Manufacturer's/Suppliers's Name

Lot/Identification/Batch/Melt No. Sizes and

Quantity supplied

Results of dimensional inspection, chemical analysis, mechanical and electrical tests as per this specification.

15.0 PACKING AND MARKING:

The material supplied shall be suitable packed to avoid damage during transit.

Each package shall be legibly marked or labelled with the following information.

AA 12017 : Oxygen Free High Conductivity Copper
 Tube - Medium Hard.

BHEL Order No

Manufacturer's/Supplier's Name

Lot/Idetification/Batch/Melt No. Size and Quantity
 supplied

16.0 REFERRED STANDARDS (Latest Publications Including Amendments)

1) IS: 191 2) IS:440 3) IS: 613 4) IS: 1501 (Part 1) 5) IS: 1608
 6) IS: 3635 7) BS: 1977 8) ASTM E 1004.