E N Q U I R Y

BPC 0007

ENQUIRY

TWO PART BID

E-TENDER

भारत हैवी इलेक्ट्रिकल्स लिमिटेड, पिपलानी, भोपाल– ४६२०२२ (भारत)

सामग्री प्रबंधन विभाग

BHARAT HEAVY ELECTRICALS LIMITED, PIPLANI, BHOPAL–462022 (INDIA)

MATERIALS MANAGEMENT DIVISION

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

ENQUIRY NO	E5143159
ENQUIRY DATE	27/09/24
ENQUIRY DUE DATE	07/10/24

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	1	2	1	120541108

GUARANTEE CERTIFICATE	Y	SUPPLY CONDITION	IDENTIFICATION MUST
TEST CERTIFICATE	Y		
INSTRUCTION BOOKLET	N	TECHNICAL CONDITION	AS PER PI
SAMPLE	N		
GATE PASS	Y	INSPECTION CONDITION	BY BHEL AUTHORISED TPIA AT VENDORS WORK

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	BP9094722127	END SHIELD NDE FULLY FINISHED AS PER BHEL DRG. NO 04454492001 REV 18 VAR.00. QAP-TM-12545 TO BE FOLLWED.	NO	50.000	30	1	25.000	205	21/11/24
						2	25.000	205	21/11/24

REMARK REFER NIC E- TENDER PORTEL FOR DETAILS.

DRAWING Y **PURCH SPEC** Y **CATALOUGE** N **PLAN** Y **TWO PART BID** Y

SUPP CD.	SUPP NAME	MSME	STATUS	PMD	Cust Appr

S.NO	INDENT NO	ITEM NO	CATEGORY	ENQUIRY QTY.
1	120541108	1	4000	50.000

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.

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

NAME : SHRI MANOJ KUMAR DUBEY

DESG : ENGINEER

0755-2502379

manojdubey@bhel.in

SIGN & SEAL

TENDER DETAILS

ENQUIRY NO. – E5143159, DUE ON 07-10-2024.

Description: RATE CONTRACT FOR END SHIELD NDE FULLY FINISHED AS PER BHEL DRG. NO 04454492001 REV 18 VAR.00. QAP-TM-12545 TO BE FOLLWED.

TENDER QTY: 50 Nos +/- 30%

DELIVERY REQUIREMENT - SCHEDULED DELIVERY DATE SHALL BE WITHIN 60 DAYS FROM THE PO DATE & THEREAFTER SUBSEQUENT. LOT OF 25 NOS. SCHEDULED DELY. DATE SHALL BE WITHIN 30 DAYS FROM THE SCHEDULED DELIVERY DATE. OF THE PREVIOUS LOT.

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

NOTE: ALL THE TERMS OF SUBJECT TENDER SHALL BE IN ACCORDANCE WITH "GENERAL TERMS AND CONDITIONS TO ENQUIRY BP 200102B". VENDORS ARE REQUIRED TO COMPLY AFORESAID ENQUIRY TERMS OF BHEL.

1) RATE CONTRACT TERMS: WE INTEND TO ENTER INTO RATE CONTRACT FOR ORDERING UPTO 12 (TWELVE) MONTHS FROM RC FREEZING DATE.
2) NO. OF BID PARTS: 2 (TWO)
3) DELIVERY TERMS: F.O.R. DESTINATION
4) DELIVERY AT: CRX, BHEL, BHOPAL- 462022
5) VALIDITY OF OFFER: 90 DAYS FROM TECHNICAL BID OPENING DATE
6) PRICE BASIS: FIRM.
7) BHEL STANDARD PAYMENT TERMS: 100% payment in 90 days of receipt (45 days for MSE including UDYAM registered suppliers as per relevant act in force), subject to acceptance of material and relevant documents at BHEL. Pl refer GTC BP200102B
8) PENALTY: APPLICABLE, AS PER ATTACHED GTC BP 200102B.
9) INSPECTION CONDITION: BY BHEL AUTHORISED TPIA AT VENDORS WORK
10) SUPPLY CONDITION: IDENTIFICATION MUST
11) TECHNICAL CONDITION: AS PER PQR, DRAWING, SPECIFICATION, QAP ETC ATTACHED
12) GUARANTEE CERTIFICATE: YES
13) TEST CERTIFICATE: YES
14) SAMPLE: NO
15) TOOLS / GAUGES / FIXTURES CONDITION: NA
16) EVALUATION CRITERIA: OVERALL L1 BASIS
17) SPLITTING OF ORDER: NO. HOWEVER, DISTRIBUTION IN COMPLIANCE WITH LATEST GUIDELINES FOR MSE AND MII WILL BE FOLLOWED FURTHER

18) TENDER FEE: NOT APPLICABLE

19) REVERSE AUCTION: NOT APPLICABLE

20) EVALUATION CURRENCY: SHALL BE INR**.**

21) QTY. VARIATION: QTY. IS TENTATIVE & MAY VARY UPTO +/-30%

22) QAP: APPLICABLE AS PER ATTACHED QA PLAN.

23) ADDITIONAL TENDER REMARKS:

ENQUIRY IS FOR RATE CONTRACT WHICH IS TO BE KEPT VALID FOR ORDERING UPTO 12 MONTHS FROM RC FREEZING DATE FOR ORDERING. ORDERING WILL BE DONE AGAINST FIRM REQURIEMENT AS & WHEN NEEDED AND RC MAY BE CLOSED AT ANY TIME WITHOUT ASSIGNING REASONS WHATSOEVER IT MAY BE.

SUBMIT YOUR TENDER IN TWO PART BID BASIS.

ANNEXURE-IX OF NIT TO BE DULY FILLED / SIGNED & SHOULD FORM PART OF TECHNO-COMMERCIAL OFFER.

SPECIAL / GENERAL TERMS & CONDIOTIONS OF ENQUIRY, RA TERMS AND CONDITIONS AS PER NEW GUIDELINES, PQR ETC. ARE ENCLOSED.

INTEGRITY PACT –Not applicable

UNREGISTERED VENDORS ARE REQUESTED TO SUBMIT THE REQUISITE DOCUMENTS FOR REGISTRATION BY BHEL ONLINE REGISTRATION PORTAL (https://supplier.bhel.in).

SPECIAL CONDITIONS OF NIT:

1. For this procurement, Public Procurement (Preference to Make in India) Order (PPP-MII Order), 2017 vide No. P-45021/2/2017-B.E.-II dated 15.06.2017, 28.05.2018, 29.05.2019 & 04.06.2020 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of contract / PO / WO against this NIT.

2. Technical Pre-Qualification Requirements (PQR) for procurement of Item: Technical PQR for "END SHIELD NDE FULLY FINISHED"– 500 Nos, +/- 30% is attached as a part of NIT. The same is to be followed and complied with Duly filled & signed PQR shall be submitted along with the offer along with desired documents as per PQR.

3. FINANCIAL PQR IS APPLICABLE: Not applicable.

4.1 . Integrity Pact (IP)- Not Applicable**.**

4.2 -DULY FILLED INTEGRITY PACT FORMAT – Not applicable.

5. Offers of suppliers who are in 'Hold/Banned' status in BHEL Bhopal PMD shall not be considered.

6. ANY DEVIATION OF GTC BP200102B (GENERAL TERMS & CONDITIONS OF ENQUIRY ATTACHED) WHERE VENDOR RESPONSE IS NOT AFFIRMATIVE TO BE CLEARLY INDICATED, ELSE BHEL WILL CONSIDER THAT ALL THE TERMS & CONDITIONS OF GTC BP200102B ARE ACCEPTABLE TO VENDORS.

7. IDENTIFICATION MUST AS PER TENDER TECHNICAL (DRAWING, SPECIFICATION ETC.) TERMS. REJECTION CLAUSE APPLICABLE AS PER GTC BP 200102B.

8. EVALUATION IN CASE OF MORE THAN ONE L-1 BIDDER:
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.

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).

RANKING WILL BE DONE ACCORDINGLY. DECISION OF BHEL IN SUCH SITUATIONS SHALL BE FINAL AND BINDING.

9. 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.

IN CASE, THE BIDDER IS FOUND HAVING INDULGED IN ABOVE ACTIVITIES, SUITABLE ACTION SHALL BE TAKEN BY BHEL AS PER EXTANT POLICIES / GUIDELINES.

10. No request for extension of tender due date will be entertained after due date and time of tender opening under any circumstances. Hence all vendors are requested to submit their bid well within due date and time only.

11. 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.

12. For this procurement, Public Procurement (Preference to Make in India) Order (PPP-MII Order), 2017 vide No. P-45021/2/2017-B.E.-II dated 15.06.2017, 28.05.2018, 29.05.2019 & 04.06.2020 and subsequent Orders issued by the respective Nodal Ministry shall be applicable even if issued after issue of this NIT but before finalization of contract / PO / WO against this NIT.

In the event of any Nodal Ministry prescribing higher or lower percentage of purchase preference and / or local content in respect of this procurement, same shall be applicable.

13. Vendors to also inform:
a. Self-certification of Minimum Local content if more than 50%: Yes / No.
b. Spell out details of location of value addition.

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.

14. Margin of purchase preference to make in India is 20% as per Govt. of India Order No. P-45021/2/2017-BE-II DTD 15.06.17, 28.05.2018, 29.05.2019 & 04.06.2020 and subsequent Orders issued by the respective Nodal Ministry. Suppliers to comply & take a note of the same.

15. 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 04.06.2020 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.

16. FRAUD PREVENTION POLICY: THE BIDDER ALONG WITH ITS ASSOCIATE / COLLABORATORS / SUB-CONTRACTORS / SUBVENDORS / CONSULTANTS / SERVICE PROVIDERS SHALL STRICTLY ADHERE TO BHEL FRAUD PREVENTION POLICY DISPLAYED ON BHEL WEBSITE HTTP://WWW.BHEL.COM AND SHALL IMMEDIATELY BRING TO THE NOTICE OF BHEL MANAGEMENT ABOUT ANY FRAUD OR SUSPECTED FRAUD AS SOON AS IT COMES TO THEIR NOTICE. BHEL CONCILIATION SCHEME SHALL BE APPLICABLE.

17. GST TDS CLAUSE: VIDE NOTIFICATION NO. 50/2018 DATED 13.09.18, SECTION 51 CGST HAS BEEN IMPLEMENTED BY CBIC WHICH PROVIDES FOR GST TDS @ 2% (IGST 2% OR CGST 1% + SGST 1%) & SHALL BE APPLICABLE WHERE CONTRACT VALUE IS MORE THAN RS. 2.5 LAKHS & SUPPLIER IS REGISTERED

UNDER GST. TDS RETURN SHALL BE FILED AND TDS CERTIFICATES SHALL BE ISSUED BY BHEL AS PER APPLICABLE PROVISIONS. AS PER SEC 51 OF CGST ACT READ WITH NOTIFICATION 50 OF CENTRAL TAX DATED 13TH SEP 2018, TDS SO DEDUCTED SHALL BE REFLECTED ON THE GST PORTAL OF THE VENDOR / CONTRACTOR. IT SHALL BE AS PER PREVAILING GOVERNMENT NORMS AS APPLICABLE.

18. 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. GeM aims to enhance transparency, efficiency and speed in public procurement. Detailed Instructions/ Guides/ Videos/ FAQs for registration and processes are available on the portal (https://gem.gov.in).

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.

19. "The offers of the bidders who are under suspension as also the offers of the bidders, who engage the services of the firms debarred across BHEL, shall be rejected. The list of firms debarred across BHEL is available on BHEL web site www.bhel.com.

1.0 Integrity commitment, performance of the contract and punitive action thereof:

1.1. Commitment by BHEL:
BHEL commits to take all measures necessary to prevent corruption in connection with the tender process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

1.2. Commitment by Bidder/ Supplier/ Contractor:

1.2.1. The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India.

1.2.2. The bidder/ supplier/ contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.

1.2.3. The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.

If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage indulges in malpractices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the price or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder/ supplier/ contractor as per extant guidelines of the company available on www. bhel.com and/or under applicable legal provisions".

20. "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:

a) they have controlling partner (s) in common;·

or

b) they receive or have received any direct or indirect subsidy/ financial stake from any of them;

or

c) they have the same legal representative/agent for purposes of this bid;

or

d) they have relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another Bidder,·

or

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. However, this does not limit the inclusion of the components/ sub-assembly/ Assemblies from. one bidding manufacturer in more than one bid;

or

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:

1. The principal manufacturer directly or through one Indian agent on his behalf; and

2. Indian/foreign agent on behalf of only one principal,·

or

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

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. "

GENERAL & SPECIAL TERMS AND CONDITIONS OF ENQUIRY AND INDIGENOUS P.O., BHEL SPECIFICATION, DRAWINGS, DECLARATION AGAINST CARTEL FORMATION ARE ENCLSOED. PLEASE FILL UP TECHNO-COMMERCIAL ANNEXURE AND DECLARATION AGAINST CARTEL FORMATION DULY SEALD AND SIGNED PROPERLY AND SEND IT ALONG WITH YOUR OFFER.

Techno-Commercial Annexure

(To be filled by supplier and submit with offer)

Tender No.		**E5143159**		
Description :		**RATE CONTRACT FOR END SHIELD NDE FULLY FINISHED AS PER BHEL DRG. NO 04454492001 REV 18 VAR.00. QAP-TM-12545 TO BE FOLLWED.** **TENDER QTY.: 50 Nos +/- 30%**		
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 of tender enquiry	Yes / No. (If "No" please mention item number 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

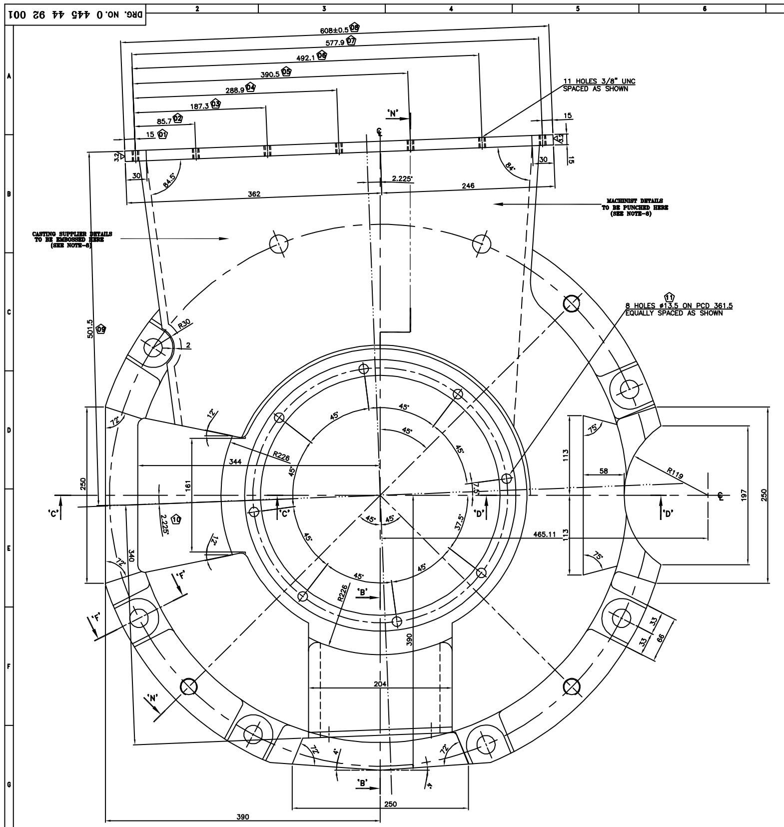
(To be filled by supplier and submit with offer)

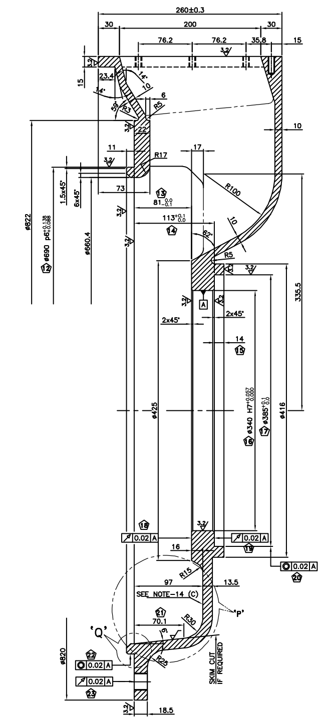
Tender No.		**E5143159**		
Description :		**RATE CONTRACT FOR END SHIELD NDE FULLY FINISHED AS PER BHEL DRG. NO 04454492001 REV 18 VAR.00. QAP-TM-12545 TO BE FOLLWED.** **TENDER QTY.: 50 Nos +/- 30%**		
Sr. No.	**ELEMENTS**	**Standards**	**To be offered/confirmed by supplier**	**Remarks, if any**
25	Terms of Payment (100% payment in 90 days of receipt (45 days for MSE including Udyam registered suppliers as per relevant act in force), 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	Yes / No (In case of "No", your offer will be loaded suitably)		
30	Confirmation that documents pertaining to technical PQR & Financial PQR (if any) has been submitted	Yes / No		
31	Acceptance to "REVERSE AUCTION" if conducted (As per BHEL's RA policy)	Yes / No		
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	

FIRST ANGLE PROJECTION

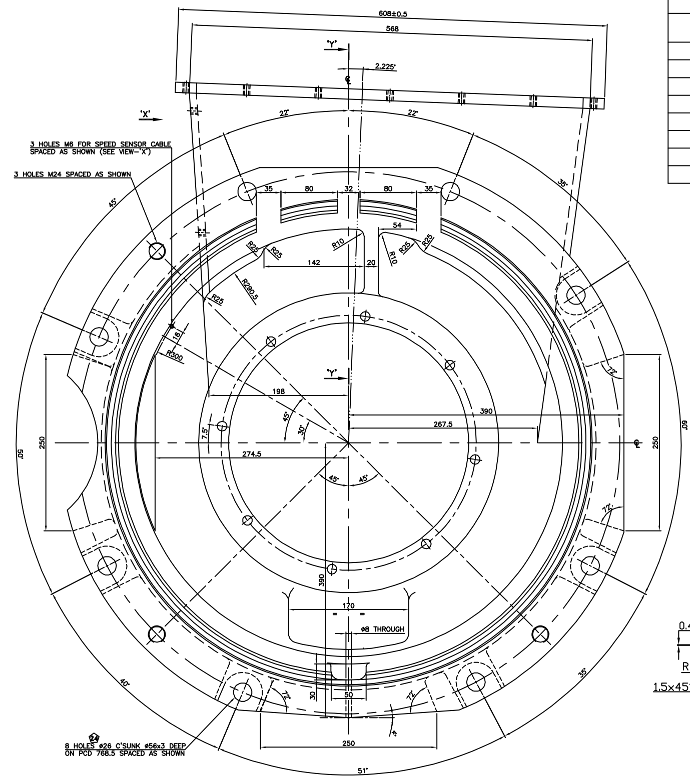
(ALL DIMENSIONS ARE IN mm)

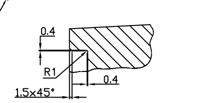
DRG. NO. 0 445 44 92 001





SECTION-'NN'

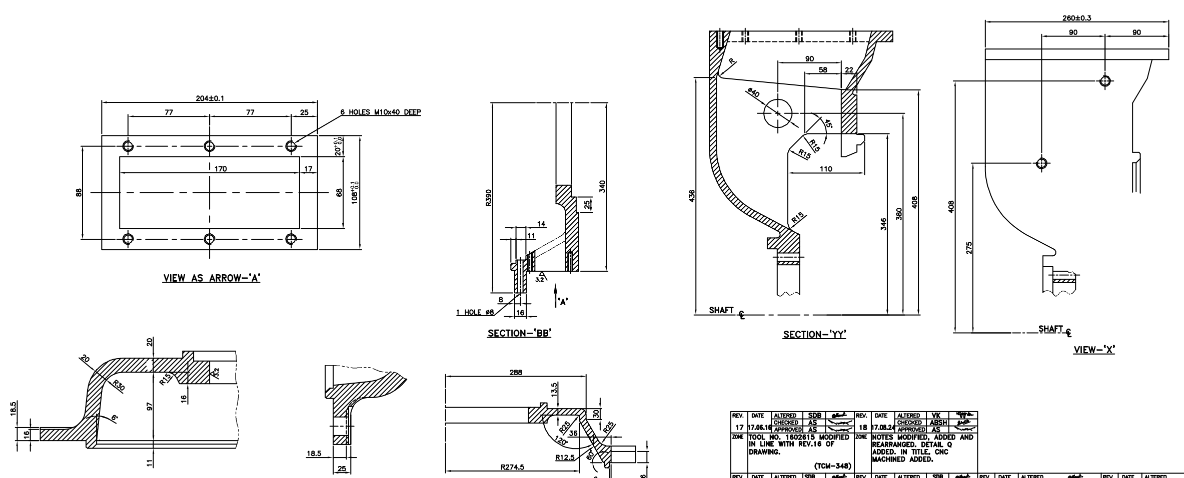




DETAIL-'Q'

TOOL LIST		
IT NO.	TOOL NO.	DESCRIPTION
	1602614	MILLING FIXTURE
	1602615	DRILL JIG FOR ALL HOLES WITH (S/F) SPIGOT LOCATION ø691.50/691.56
	1602616	DRILL JIG FOR 6xM10
	1602617	DRILL JIG FOR HOLES IN SECTION-'NN'
	1602618	PIN GAUGE 340±0.057
	1602619	SNAP GAUGE 690.4 $^{+0.135}_{+0.085}$
	1602787	STEP GAUGE 92.0/91.9
	1602814	CALLIPER GAUGE (S/F) 691.43/691.48
	1602868	DEPTH GAUGE 81 $^{+0.0}_{-0.1}$
	1602875	CALIPER GAUGE 113+0.1/0.0

ISOMETRIC VIEW (FOR REF. ONLY)



VIEW AS ARROW-'A'

SECTION-'BB'

SECTION-'YY'

VIEW-'X'

SECTION-'CC'

SECTION-'FF'

SECTION-'DD'

NOTES:-

1. CASTING RAW MATERIAL SHALL BE FROM CLASS 'A' FOUNDRY (AS PER IS: 12117-1996). FOR DETAILS REFER SL. NO. 1 OF QAP FOR CASTING: QTM/QAP/VENDOR/13-14/001 (LATEST REVISION).
2. ADDITIONAL MATERIAL SHALL NOT BE PROVIDED ON SURFACES WHERE MACHINING SYMBOL IS NOT INDICATED.
3. TOLERANCE ON UNTOLERATED CASTING DIMENSIONS SHALL BE AS PER IS: 4897, CLASS 2. UNSPECIFIED CASTING RADII TO BE 4 MM.
4. CASTING TO BE STRESS RELIEVED & SHOT BLASTED.
5. SURFACE FINISH ON UNMACHINED SURFACES TO BE AS PER IS:3073.
6. ITEM TO BE MPI TESTED TO SPEC. AA0850133 WITH ACCEPTANCE CRITERIA AS PER LEVEL II OF SPEC. AA0850134.
7. RADIOGRAPHIC EXAMINATION & ACCEPTANCE LIMIT SHALL BE AS PER ASTM E-446 AS MENTIONED IN TABLE-1 BELOW:-

TABLE-1

DEFECT	LEVEL
SHRINKAGE	3
INCLUSION	3
GAS POROSITY	3
CRACK	NOT ACCEPTABLE
HOT TEARS	NOT ACCEPTABLE
CHAPLETS	NOT ACCEPTABLE

8. IDENTIFICATION MARKING (EMBOSSING & PUNCHING) TO BE DONE AT THESE LOCATIONS AS PER SPECIFICATION TM12548.
9. MACHINING ALLOWANCE:-
   A) 5-7 MM PER TOOL POINT IN CASE ITEM IS SUPPLIED IN AS CAST CONDITION.
   B) 3-5 MM PER TOOL POINT IN CASE ITEM IS SUPPLIED IN ROUGH MACHINED CONDITION.
10. REMOVE SHARP CORNERS.
11. PROFILE AS SHOWN IN VIEW-'P' TO BE ENSURED IN CASTING.
12. WEIGHT OF ROUGH MACHINED CASTING SHOULD BE WITHIN 140±5% KG.
13. WEIGHT OF FULLY FINISHED COMPONENT SHOULD BE WITHIN 110±2% KG.
14. PAINTING INSTRUCTIONS:-
   A) AS CAST SURFACES TO BE PRIMER PAINTED WITH INORGANIC ETHYL ZINC SILICATE (AA56113) AS PER SCHEME NO. 8 OF TABLE-II (a) OF SPEC. AA0674123.
   B) TEMPORARY RUST PREVENTIVE (TRP) AS PER AA55152 TO BE APPLIED ON MACHINED SURFACES.
   C) AFTER FINISH MACHINING PAINT INTERNAL SURFACE WITH INSULATING ENAMEL PAINT BP27595/CIT064 TO PROCESS SPEC. TM94217, CL.5.
15. QUALITY CHECKING:-
   A) TO BE DONE AS QAP NO. QTM/QAP/VENDOR/13-14/001 (LATEST REVISION) IN CASE ITEM IS SUPPLIED IN AS CAST/ROUGH MACHINED CONDITION/FULLY FINISHED CONDITION.
   B) TO BE DONE AS QAP NO. TM12545 (LATEST REVISION) IN CASE ITEM IS SUPPLIED IN FULLY FINISHED CONDITION.
   C) ITEM TO BE ULTRASONICALLY TESTED TO SPEC. AA0850104 LEVEL-II IN CASE ITEM IS SUPPLIED IN ROUGH MACHINED/FULLY FINISHED CONDITION.
   D) ALL 24 NOS."⬠" MARKED DIMENSIONS ARE CRITICAL TO QUALITY (CTQ) & SL. NO. OF CTQ DIMENSIONS ARE INSCRIBED IN ⬠ e.g.(24)

REV.	DATE	ALTERED / CHECKED / APPROVED	DESCRIPTION
18	17.08.24	VK / ABSH / AS	NOTES MODIFIED, ADDED AND REARRANGED. DETAIL Q ADDED. IN TITLE, CNC MACHINED ADDED.
17	17.06.16	SDB / AS / AS	TOOL NO. 1602615 MODIFIED IN LINE WITH REV.16 OF DRAWING. (TCM-348)
16	10.06.16	SDB / ABHIJIT / ABHIJIT	8 HOLES ø13.5 WERE 8 HOLES ø11.5 (REF. C/6). 3D VIEW UPDATED.
15	28.01.16	SDB / AS / AS	IN TOOL LIST, TOOL NO. 1602875 ADDED. (TCM-347)
14	06.01.16		IN SEC.-'NN' DIMS. 33,92 $^{+0.0}_{-0.1}$ & 32 DELETED. DIMS. 11 & 113 $^{+0.1}_{-0.0}$ ADDED & CHAMF. 2x45° WAS 1.5x45°.
13	17.10.15		IN TOOL LIST, TOOL NO. 1602868 WAS NOT ON. (TCM-347)
12	06.10.15		IN SECTION-'AA' CHAMFER 1.5x45° (REF. D-8) & DIM. 81 $^{+0.0}_{-0.1}$ ADDED (REF. C-8).
11	25.08.14		DESCRIPTION OF TOOL NO. 1602615 CHANGED AND TOOL NO. 1602814 WAS NOT ON. (TCM-344)
10	CONT.		DIMENSIONSARE "⬠" MARKED & NUMBERED. NOTES-9 & 10 ADDED. TOOL NO. 1602787 WAS NOT ON. (TCM-344)
10	05.06.14		IN SECTION-'NN' DIMS. 6,22, 33,73,70.1 & R30 WERE 15, 31,42,82,52.2 & R50. DIM. 4 WAS ON. & DIM. 6° WAS NOT ON. CRITICAL TO QUALITY
09	CONT.		IN SECTION B-B DIM. 110 WAS ON & DIM. 20 WAS 16. SEC.-'CC' MODIFIED. IN SE.-'DD' DIMS. 288 & R274.5 WERE 292 & R280. IN VIEW-X DIM. 260±0.3 WAS 260. DIM. 390 WAS 391.5
09	21.11.13		MARK OF SECTION 'N-N','Y-Y' & 'B-B' ARE MODIFIED. NOTE-6 TO 8 WERE NOT ON. DIM. 198 WAS ON. DIM. 204±0.1 WAS NOT ON. DIM. 58 & 197 WERE 36 & 198. CONT.
08	21.6.12	CKSB / DK / AS	VIEW DIM. 608±0.5 WAS 608 & √ SYMBOL WERE NOT ON. (REF. A,B/1,5). DIM. 260±0.3 WAS 260 (A/8). SECTION-'BB' DIM. 11 WAS 10.
07	31.1.04		REF. (G-9) C'BORE ø56 WAS ø52.
06	02.9.03	-sd- / -sd- / -sd-	REF.(A-5) 3/8" UNC WAS M10.
05	04.6.03	-sd- / -sd- / -sd-	NOTE 5 WAS NOT ON. VIEW OF SECTION 'YY' MODIFIED & DIMS. 408,380,346 & 58,90,436 WERE NOT ON & SECTION-DD R280 WAS NOT ON REF.(JK-11 & J-7/8),REF.(A-5) 11 HOLES M10 WAS 13 HOLES M10.
04	13.5.03	-sd- / -sd- / -sd-	REF.(AB-7,8) DIMS. 76.2,76.2 & 35.8 WERE DIMS. 68.35,68.35 & 47.25. IN VIEW REF.(C-6) 8-HOLES ø11.5 WAS ø13.5.
03	29.3.03	-sd- / -sd- / -sd-	REF.(J.K.-7,8 &10,11) DIMS. 292 WAS 302.R25 WAS ON VIEW SECTION-DD MODIFIED & DIM. 22,37 WERE 16.5,27. REF.(K-9) DIM. 20 WAS NOT ON. IN VIEW THREE HOLES M24 WERE NOT ON.
02	01.1.03	-sd- / -sd- / -sd-	REF.(G-11) 51° WAS 50° AND WT.126.7 WAS NOT ON. IN TOOL NOS. 1602614 TO 1602619 WERE TOOL NOS. 1602214 TO 1602219.
01	22.11.02	-sd- / -sd- / -sd-	NOTE WAS NOT ON(B/5,6) DIMN.302 WAS NOT ON(H/7) DIMN.ø385 $^{+0.1}_{0}$ WAS ø385.4 MATERIAL BP19953 WAS BP19993.

QTY VAR 00	REMARKS	VAR. NO.	ITEM NO.	DESCRIPTION	STD	DRAWING NO.	IT.NO. / VAR	MATL. CODE / MATL. SPCN.	UNIT WT. / QTY.
001	ST.NO. 9094720400		001	END SHIELD (NDE) CASTING				AA19721	

ADDITIONAL INFORMATION

STATUS OF DRAWING

DISTRIBUTION OF PRINTS: TME-1, TXM-3, TNX-1

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT: IM4507AZ 4000 HP BG DE LOCO

BHARAT HEAVY ELECTRICALS LTD. BHOPAL

	NAME	SIGN	DATE
DRN.	R.KOKJE	-sd-	12/10/02
CHD.	SGD	-sd-	13/10/02
APPD.	N.SINGH	-sd-	14/10/02

NO. OF VAR.: 01

DEPT.	CODE	UNTOL. DIMS. GR.	SCALE	WEIGHT (K.G.)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEM
TME	405	AA0230208 GR.'M'	NTS	110.0	2 445 44 92 001	003	001

TITLE: END SHIELD (NDE) (CNC MACHINED)

DRAWING NO. 0 445 44 92 001 — REV. 18 — SHT. NO. 01 — NO. OF SHT. 01

SIZE A0

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

588882/2024/HEP-TXM20500

	CORPORATE PURCHASING SPECIFICATION	AA 197 21
		Rev. No. 03
		PREFACE SHEET

SPHEROIDAL OR NODULAR GRAPHITE IRON CASTINGS - Gr: 400/15

FOR INTERNAL USE ONLY
REMOVE THIS PREFACE SHEET BEFORE ISSUE TO SUPPLIERS

Comparable Standards:

1. INDIAN	:	IS: 1865 - 1991 (Reaffirmed 2005) Gr: SG 400/15
2. BRITISH	:	B.S.2789-1985 Gr: 420/12
3. GERMAN	:	DIN EN 1563-1997 Gr: EN GJS 400-15

Suggested / Probable Suppliers and Grades:

Use plant vendor's list

User Plant References:

1. BHOPAL	:	PS 11313
2. HYDERABAD	:	1. BS 2789-73,Gr:420/12 2. Meehanite SF 3. DIN 1693-73,Gr:GGG40
3. HPBP,TIRUCHY	:	IS : 276. Gr:1

Revisions:			APPROVED : INTERPLANT MATERIAL RATIONALISATION COMMITTEE-MRC (FC&F+HTM)		
RA as per Cl. 33.2.0 of MRC – FCF+HTM					
Rev. No. 03	Amd.No.	Reaffirmed	Prepared	Issued	Dt. of 1 st Issue
Dt: 01.05.2008	Dt :	Year : May 2008	CORP R&D	Corp. R&D	DEC., 1977

588882/2024/HEP-TXM20500

	CORPORATE PURCHASING SPECIFICATION	AA 197 21
		Rev. No. 03
		PAGE 1 OF 4

SPHEROIDAL OR NODULAR GRAPHITE IRON CASTINGS - Gr: 400/15

1.0 GENERAL

This specification governs the quality requirements of Spheroidal or Nodular Graphite Iron Castings having a tensile strength of 400 N/mm^2, minimum.

2.0 APPLICATION

Suitable for general engineering purpose.

3.0 CONDITION OF DELIVERY

As cast unless otherwise specified on BHEL order/drawing.
Castings may be supplied without heat treatment provided the properties are attained without heat treatment.

Castings shall not be painted.

4.0 COMPLIANCE WITH NATIONAL / INTERNATIONAL STANDARD

Castings shall comply with the following national standards and also meet the requirements of this specification.

IS: 1865-1991 (Reaffirmed 2005) : Iron Castings with Spheroidal or Nodular Graphite Gr: SG 400/15

5.0 DIMENSION AND TOLERANCES

Castings shall be true to the pattern / drawing.

Holes for machining up to and including 50mm in diameter are to be cast solid, unless otherwise stated on BHEL order / drawing.

Unless otherwise specified on BHEL order/ drawing, untoleranced dimensions for the casings shall be as per tolerance class 4 of BHEL standard AA 023 04 02.

Revisions : RA as per Cl. 33.2.0 of MRC – FCF+HTM			APPROVED : INTERPLANT MATERIAL RATIONALISATION COMMITTEE-MRC (FC&F+HTM)		
Rev. No. 03	Amd.No.	Reaffirmed	Prepared	Issued	Dt. of 1st Issue
Dt: 01.05.2008	Dt :	Year : May 2008	CORP R&D	Corp. R&D	DEC., 1977

6.0 MANUFACTURE

The method of manufacture is left to the discretion of the manufacturer.

7.0 HEAT TREATMENT

Heat treatment, if considered necessary to attain the properties specified, is left to the discretion of the manufacturer. Record of heat treatment of each batch shall, however, be maintained by the manufacturer.

Any flame or arc cutting, which may have to be done, shall be carried out before heat treatment.

Test pieces shall also be heat treated along with the castings they represent.

8.0 FINISH

All castings shall be properly fettled and dressed and all surfaces shall be thoroughly cleaned.

Machined surfaces shall have the surface finish as indicated in the drawing.

9.0 FREEDOM FROM DEFECTS:

Castings shall be free from defects such as porosity, blow holes, sand inclusions, shrinkage's, cavities, hard spots, cold shuts, cracks, etc. which may adversely affect machining and utility of castings.

When it is necessary to remove risers by flame cutting, care shall be taken to make the cut at sufficient distance from the body of the casting, so as to prevent any defect being introduced into the casting due to local heating.

10.0 CHEMICAL COMPOSITION

The composition of iron is left to the discretion of the manufacturer. (But in special applications this may be agreed to between BHEL and manufacturer).

11.0 TEST SAMPLES:

Selection of test samples shall be in accordance with clause 10 and 11 of IS: 1865.

12.0 MECHANICAL PROPERTIES:

12.1 Tensile:

When tested in accordance with IS:1608, the test pieces (14 mm gauge diameter and 70 mm gauge length) shall show the following properties:

Property	Separately cast test sample	Integrally cast test sample, casting thickness, mm	
		30 to 60	61 to 200
Tensile strength, N/mm^2 , min.	400	390	370
Proof stress, 0.2% N/mm^2, min.	250	250	240
Elongation, percent, min.	15	15	12

12.2 Hardness (Brinell):

130 to 180 HB

13.0 MICROSTRUCTURE (For information only):

Predominant structural constituent is Ferrite.

14.0 REPAIR OF CASTINGS:

Repair of castings shall not be carried out by the manufacturer without the permission of BHEL.

15.0 TEST CERTIFICATES

Three copies of test certificates shall be supplied unless otherwise stated on order, preferably in the test certificate format annexed to this specification (Annexure -1).

16.0 PACKING AND MARKING

Castings shall be suitably packed to prevent corrosion and damage during transit. Machined surfaces shall be properly protected with anticorrosive compounds. Each package or casting (when supplied separately) shall be legibly marked with the following information.

AA 19721: S.G Iron castings-Gr:400/15.
BHEL Order No.
Consignment/Identification No.
Melt No.
Weight
Supplier's Name

17.0 REFERRED STANDARDS (Latest Publications Including Amendments):

1. IS: 1865 2. AA 023 04 02

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ANNEXURE 1 - RECOMMENDED TEST CERTIFICATE FORMAT FOR CASTINGS

SUPPLIERS'S NAME AND ADDRESS

1. Customer :
2. TC No. & Date :
3. PO No. :
4. Process of Melting :
5. Deoxidisation Process
6. Cast No. & Date :
7. Batch No. :
8. Heat Code :
9. Spec.. No. :
10. Test Bar Size

II. CASTING COVERED BY T.C.

Sl. No.	Drawing No. & Item No.	Description	Quantity & Weight

12. CHEMICAL COMPOSITION (PERCENT)

Element	C	Si	Mn	S	P										
As per Min.															
Spec. Max..															
Actual Values.															

13. HEAT TREATMENT
(To be accompanied by Recorder Chart, wherever called for)

Condition	Temp °C	Soaking Time. Hrs..	Cooling Medium

14. MECHANICAL PROPERTIES

	T.S. N/mm2	Y.S. 0.5/0.2% Proof N/mm2	% E on GL 5.65 SO	% R.A. Min	Hardness BHN Min. 3 Values	Impact Value, Joules	Bend	
As per Min.								
Spec. Max.								
Actual Values.								

15. Surface Finish (When called for in the order/drg)	
16. DIMENSIONAL INSPECTION	

17.NON-DESTRUCTIVE TESTS

Nature of Test	Acceptance Level	Instrument used	Range	Results	Any other details
Ultrasonic					
Radiographic					
Dye Penetrant/ Magnetic Particle					

18. OTHER TESTS, IF ANY (MICRO-Scopic, Hydraulic, Etc.)	
19. IDENTIFICATION ON CASTING AS PER CPS.	

We hereby certify that the items mentioned above have been tested and inspected in our presence and are found to be in accordance with the drawings, specifications and purchase order.

Signature & Seal of the Inspecting Officer (Purchase Representative)

Date :

Signature and Seal of the Chief of Quality Control Chief Metallurgist of the Supplier.

Date :

INSTRUCTION:

a) If steel is produced by LD or Oxygen process, Nitrogen content should be furnished and shall not exceed 0.009%.
b) Test Certificates are to be furnished as per Purchase Order and Specifications, in A4 Size transparent paper.
c) All the entries including signature should be in black ink.
d) If testing is done by outside agencies, the original TCs shall be furnished.
e) The actual Test Certificate may run into more than one A4 size paper, if needed, to facilitate filling up of details.

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PROCEDURE FOR MAGNETIC PARTICLE EXAMINATION

1.0 SCOPE:

1.1 This standard outlines the procedure for magnetic particle examination of ferro-magnetic materials.

1.2 Typical surface and subsurface discontinuities detectable by this method are cracks, seams, laps, cold shut, inclusions,etc.

1.3 This shall be applied to all forms of ferromagnetic material as formed and semiformed as well as, finished state, such as welds, forgings, castings, etc.

1.4. This standard is generally based on ASTM E 709.

2.0 PERSONNEL REQUIREMENT:

Personnel performing non-destructive examination and evaluation shall be qualified to the recommended practice SNT-TC-1A or any other recognised practice.

3.0 TEST METHOD:

Finely divided magnetic particles are applied to the surface of a part which has been suitably magnetised. The particles are attracted to regions of magnetic non-uniformity associated with defects and discontinuities, thus producing indications which are observed visually. The magnetic particle is applied either as dry powder or in a wet suspension in a liquid medium.

4.0 SURFACE CONDITION/PREPARATION:

The surface being inspected shall be clean and dry. It shall be free from dirt, oil, grease, sand, rust or loose scale. As cast or as welded surfaces are generally satisfactory if clean. A pressure blast is useful for this purpose. Thin paint does not interfere with the formation of indications but must be removed at points where electrical contact is to be made. If the surface is unusually rough, such as with burned in sand or very rough weld bead, interpretation may be difficult because the particle is being trapped mechanically. In case of doubt, light grinding may be necessary to determine if actual indications are present.

5.0 SEQUENCE OF OPERATION:

5.1 Method Of Examination:

Examination shall be generally carried out by the continuous method, i.e., the magetising current remains on, while the examination medium is being applied and excess being removed.

5.2 Magnetisation:

Any suitable and appropriate means for establishing the necessary magnetic flux may be employed, such as passing current through the material (e.g. 'Prod' method) using magnetic yoke, or wrapping the part with a coil through which a magnetising current is passed.

5.3 Examination Medium:

5.3.1 The finely divided ferromagnetic particles used for detection of discontinuities shall be of fine grain and the same shall be of high permeability and low retentivity. It shall be of dry powders (Fluorescent and nonfluoresent) ready for use, as supplied or powder concentrates (Fluorescent and non-fluoresent) for dispersion in water or suspending light petroleum distillates.

5.3.2 Dry Particles:

When dry particles are used, they shall be sprayed either by a low pressure pneumatic instrument or hand operated bulb blower. Colour of the powder shall be such as to provide adequate visual contrast with the back ground of the surface being examined. The temperature of the surface of the part under examination shall not exceed 315°C (600°F). Adequate lighting should be provided for easy observation of the indication. Some coloured organic coatings applied to dry particles to improve contrast lose their colour at higher temperatures. Fluorescent dry particles shall not be used at this high temperature. Manufacturer's recommendations for temperature limitation shall be followed.

5.3.3 Wet Particles:

When wet particles are used, the solid magnetic particles shall be suspended in a suitable liquid medium. The concentration of the particles in the liquid medium shall be 0.2 to 0.4 ml in a 100ml sample for fluorescent particles and from 1.2 to 2.4 ml in a 100 ml for non-fluorescent particles unless otherwise specified by the particle manufacturer.

5.3.4 Fluorescent Particles:

5.3.4.1 The fluorescent particle examination shall be performed using a black light in a darkened area.

5.3.4.2 The black light used for fluorescent particle testing shall be capable of developing the wave length of 365mm., in any case the wave length should be in the range of 330 to 390nm. with an intensity of not less than 1000 uw/cm^2 on the surface of the part.

5.3.4.3 The black light shall be allowed to warm up for a minimum of 5 min. prior to its use or measurement of the intensity of the ultraviolet light emission.

5.3.4.4 The examiner shall be in the darkened area for atleast 5 min. prior to examining the parts using black light so that his eyes will adopt to dark viewing. Photochromic or permanently tinted lenses shall not be worn during examination.

5.3.4.5 The black light intensity shall be measured with a black light meter at least once every 8 hours and whenever the work station is changed.

5.4 Orientation of Discontinuities And Examination Coverage:

Examination shall be conducted with sufficient overlap to ensure cent percent coverage at established test sensivity. To ensure most effective detection of discontinuities each area shall be examined at least twice with the lines of flux approximately perpendicular to each other.

5.5 **Demagnetisation:**

Demagnetisation following examination shall be carried out where residual magnetism can interfere with subsequent process or usage. Demagnetisation is not normally required on the type of parts where the dry powder Prod magnetisation is used.

6.0 METHODS OF MAGNETISATION:

6.1 **Prod Method:**

6.1.1 **Magnetising Technique:**

6.1.1.1 Magnetisation shall be accomplished by portable Prod type electrical contacts pressed against the surface in the area to be examined. To avoid arcing, a remote control switch may be provided to permit the current to be turned on after the prods have been properly positioned and turned off before they are removed.

6.1.2 **Prod Spacing:**

Prod Spacing shall be maximum of 200 mm. Shorter spacing may be used to meet the limitation of geometry or dimensions of the area being examined, or to increase the sensitivity, but prod spacing less than 75 mm usually is not recommended owing to banding of the particles around the prods.

6.1.3 **Magnetising Current:**

Alternating, direct or rectified magnetising current shall be used. The current shall be 90 to 110 A per 25mm. of prod spacing for sections less than 19mm. thick and 110 to 125 A per 25mm. prod spacing for sections 19mm. and greater.

6.1.4 Prod shall be kept free of iron pick up by frequent filing. Local areas of metal being tested which have been subjected to arcing shall be ground to clean metal wherever necessary.

6.2 **Coil Method:**

6.2.1 **Magnetising Technique:**

Magnetisation shall be accomplished by pressing current through a multiturn coil looped around the part or section of the part to be examined to produce a magnetic field parallel to the axis of the coil.

6.2.2 **Magnetising Current:**

6.2.2.1 **Encircling Coils:**

There are four empirical longitudinal magnetization formulas for using encircling coils, the formula to be used depending on the fill factor.

6.2.2.1.1 **Low Fill Factor Coils:**

In this case, the cross sectional area of the fixed encircling coil greatly exceed the cross sectional area of the part (Less than 10% coil inside diameter). The part shall be placed well within the coils and close to the inside wall of the coil. For parts with length over diameter ratio (L/D) between 3 and 15 is calculated from the following equations.

(1) Parts with low fill factor positioned closed to the inside wall of the coil:

$$= \frac{45{,}000}{L/D} \text{ Ampere Turns } (\pm 10\%)$$

(2) Parts with a low fill factor positioned in the center of the coil:

$$= \frac{43{,}000 \times R}{(6\ L/D) - 5} \text{ Ampere Turns } (\pm 10\%)$$

6.2.2.1.2 **Intermediate Fill Factor Coils:**

When the cross section of the coil is greater than twice and less than ten times the cross section of part being examined.

$$= (NI)\ hf\ (10-4) + (NI)\ lf\ (4-2)/8$$

Where

NIhf = Value calculated for high fill factor coils using

$$\frac{35000}{(L/D) + 2}\ (10\%)$$

NIlf = Value Calculated for low fill factor coils using

$$\frac{43{,}000 \times R}{(L/D) - 5}\ (10\%)$$

Where R = Coil Radius

Y = Ratio of the cross sectional area of the coil to the cross section of the part.

For example if the coil has an inside diameter of 24 cm. and part (a bar) has outside diameter of 12 cm.

$$Y = \frac{\pi(12)^2}{\pi(6)^2} = 4$$

6.2.2.1.3 **High Fill Factor Coils:**

In this case, when fixed coils or cable wraps used and the corss sectional area of the coil is less than twice the corss sectional area (Including hollow portions) of the part, the coil has a high fill factor.

For prats with in a high fill factor positional coil and for parts with L/D ratio equal or greater than 3.

$$= \frac{35{,}000}{(L/D)+2}\ \text{Ampere turns}\ (\pm\ 10\%)$$

L/D ratio for a hallow piece: When calculating L/D ratio for a hollow piece, D shall be replaced with an effective diameter Deff. Calculated using.

$$Deff. = [(At - Ah)/\pi]^{\frac{1}{2}}.$$

Where

At = Total cross section area of part

Ah = Cross sectional area of hollow portion(s) of the part.

For a cylindrical piece this is equivalent to

$$Deff. = [(OD)^2 - (ID)^2]^{\frac{1}{2}}$$

Where

OD = Outside diameter of cylinder

ID = Inside diameter of cylinder.

6.2.2.2 **Through Coils:**

For through coils the current specified in para 6.3.2 divided by number of turns shall be used.

6.3 **Direct Contact Method:**

6.3.1 **Magnetising Technique:**

Magnetising shall be accomplished by passing current end to end through the part to be tested to produce a circular magnetic field perpendicular to the current flow through the part.

6.3.2 **Magnetising Current:**

Direct or rectified current shall be used at 280 to 360 amperes per centimeter of part for diameter upto 125 mm; 200 to 280 amperes per centimeter of part for diameter grater than 250mm.
(**Note:** A different means of magnetisng shall be used for the second examination to fulfil the requirements specified in Cl.5.4).

6.4 **Yoke Method:**

6.4.1 **Application:**

This method shall be used only to detect surface discontinuities which actually come to the surface.

6.4.2 **Magnetising Technique:**

6.4.2.1 Alternating current electromagnetic yoke shall be used to magnetise, provided the yoke has a lifting power of at least 4.5 Kg and a pole spacing of 75 to 150 mm.

6.4.2.2 Alternatively direct current electromagnetic or permanent magnetic yoke shall be used to magnetise, provided the yoke has a lifting power of at least 18 kg and a pole spacing of 75 to 150 mm.

6.5 **Threading Bar and Coil Technique:**

6.5.1 If the part is hollow, flaws in a longitudinal direction may be detected by passing the magnetising current through a bar or cable held within the bore of the part. Alternatively a threading coil may be used.

6.5.2 The current strength shall be equivalent to not less than 10500 ampere turns (a.c; r.m.s value) or 15000 ampere turns (d.c.) per metre of the maximum distance of the bar cable from the surface of the bore of the part.

6.5.3 Because of limitations of the equipment, it may be necessary to magnetise the part at several positions within the bore, with the bar or cable lying on the bore surface, in which case the distance between spacing of the conductor or coil for successive checks shall not be grater than 100 mm.
Note: Magnetising particle field indicator shall be used to establish adequacy of the magnetic field.

7.0 CALIBRATION:

Calibration of the ammeter shall be done as per BHEL Standard AA 085 01 59.

8.0 EVALUATION OF INDICATIONS & INTERPRETATION:

8.1 If the indication is caused by the surface discontinuity the particles are usually tightly held to the surface by a relatively strong magnetic leakage field. The line of particles will be sharp and well defined.

8.2 If the indication is caused by surface discontinuity, the particles are held in a board fuzzy accumulation rather than being sharp and well-defined.

8.3 Non-relevant indications are caused by distortion of magnetic field resulting from magnetic writing, cold working, hard and soft spots,boundaries of heat affected zone, abrupt change of section, etc. Care shall be taken to identify and eliminate them as they may mask the actual defect.

8.4 Relevant indications are those which result from mechanical discontinuities. Linear indications are those in which the length is more than three times the width. Rounded indications are indications in which are circular or elliptical with the length less than three times the width.

9.0 REFERRED STANDARDS (Latest Publication Including Amendments):

1. ASTM E 70
2. BHEL CS AA 085 01 59

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY CONTROL TRANSPORTATION
QUALITY ASSURANCE PLAN (QAP)

Ref.: TM12545 Rev. 09 Dt.28.05.2024

QA Plan for fully finished components (with finish dimensions final machined on CNC machines) with mandatory requirement of checking on 3D CMM, supplied on fully finish basis or labour basis
Note: Components to be finished machined on CNC are Stator frame, Bearing assy. components (including end shields), Suspension tube & its assy. Components.

Part 1: Final inspection of the component before dispatch from vendor works (#)

Sl. No.	Name of the Process	Parameters of Inspection	Quantum of Check*		Mode of Inspection/ Equipment used	Drawing No./Spec./Std.	Acceptance Norms***	Requirement from supplier
			TP (Supplier)	Inspection agency				
1.	Raw material	Applicable only in case order is executed on fully finish basis						
	a. If the raw material is casting.	Applicable QAP No.: QTM/QAP/VENDOR/13-14/001 (latest revision) [Witness & Verification of RT reports & films for correlation with components, only record verification of material testing/checking parameters and verification of 3 test samples (keel blocks separately cast/integrally cast as per specification to be supplied along with consignment.) as per raw material QAP to be done by TPI. No inspection/record verification for cast/rough machined dimensions as per casting QAP.]						
	b. If the raw material is fabrication/ plate.	Applicable QAP No: QTM/QAP/FABRICATED ITEMS/VENDOR/18-19/01 (latest revision) [Only record verification of testing/checking parameters and verification of TC of plate used for fabrication of component (to be supplied along with consignment) as per raw material QAP to be done by TPI. No inspection/record verification for fabricated/rough machined dimensions as per fabrication QAP.]						
	c. If the raw material is forging.	Applicable QAP No.: QTM/QAP/VENDOR/13-14/002 (latest revision) [Only record verification of testing/checking parameters and verification of 3 test samples to be supplied along with consignment) as per raw material QAP to be done by TPI. No inspection/record verification for forge/rough machined dimensions as per forging QAP.]						
2.	Dimensions	A) Critical to quality (CTQ) dimensions as marked in drawing.	A) 100%	A) 20% (Min.) $	3D CMM	As per relevant BHEL Drawing	As per relevant BHEL Drawing	$-Inspection of 3D CMM checking shall be done Either by RDSO or TPIA(supplier to confirm before call booking)) In case of TM 6FRA6068 bearing components only. And for others inspection shall be done by agency as mentioned in PO.
		B) Other dimensions	B) 100%	C) 20% (Min.)	3D CMM / Gauges & Instruments	As per relevant BHEL Drawing	As per relevant BHEL Drawing	

गजेन्द्र सिंह राठौर/G.S. RATHORE
उप प्रबंधक/Dy. Manager
क्यू.टी.एम./QTM Division
बी.एच.ई.एल.,भोपाल/B.H.E.L. BHOPAL

अभिजीत जैन/ABHIJIT JAIN
उप प्रबंधक (डिजाइन)/Dy. Manager(Design)
टी.एम.ई. विभाग/T.M.E. Division
बी.एच.ई.एल.,भोपाल/B.H.E.L., BHOPAL

राजेश कुमार/RAJESH KUMAR
वरिष्ठ प्रबंधक/Sr. Manager
टी.एक्स.एम.विभाग/TXM Division
बी.एच.ई.एल.,भोपाल/B.H.E.L., BHOPAL

Sl. No.	Name of the Process	Parameters of Inspection	Quantum of Check*		Mode of Inspection/ Equipment used	Drawing No./Spec./Std.	Acceptance Norms***	Requirement from supplier
			TP (Supplier)	Inspection agency				
3.	Visual Inspection	Free from visual defect.	100%	100%	Visual	-	Component to be free from any abnormality such as blow hole, pin hole, dent etc.	-
4.	Identification marking	Identification marking at machining stage on the location shown in drawing or location may be taken from BHEL Engg. Dept.	100%	10%	Verification	As per relevant BHEL drawing/ specification TM12548	Identification marking as per BHEL drawing/spec. TM12548	-
5.	Paint (Visual, Dry paint thickness and Adhesion test)	Epoxy primer paint (specification AA56113) on um-machined surfaces.	100%	100%(Visual) & 10% per lot (DFT and adhesion test)	Visual and Instruments	As per relevant BHEL Drawing/ specification TM94217 (Latest Rev)	As per relevant BHEL Drawing/ specification TM94217 (Latest Rev)	Report to be submitted for- • Visual • DFT • Adhesion

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Sl. No.	Name of the Process	Parameters of Inspection	Quantum of Check*		Mode of Inspection/ Equipment used	Drawing No./Spec./Std.	Acceptance Norms***	Requirement from supplier
			TP (Supplier)	Inspection agency				
6.	Packing	Packaging suitability for transit & storage	100%	-	Visual	-	-	Each component shall be suitably packed & wrapped to avoid any damage to components during transit and ingress of water. Note: In case any damage to machined surface found during inspection at BHEL, job will be liable to be rejected.

Notes:

1) All test records, dimensional reports (3D CMMM & MANUAL) checked & reviewed by TP, QC (dully signed & sealed) as per above QAP requirement shall be submitted along with consignment.

2) Final acceptance will be based on inspection at BHEL, Bhopal.

3) (*) Quantum of inspection shall be in line with QAP unless otherwise mentioned in the drawing.

4) (**) Job shall be randomly selected from offered lot, the quantum of check (min. 1 no.) from the offered lot to be checked by QC. (e.g.: If lot size is 2 then minimum one no is to be checked).

5) (***) Sample inspection of component does not mean that the supplier will not meet drawing & specification requirements in remaining components. In case any defect / non-conformance is observed at any stage (during processing or before and after fitment in any job). the same is liable to be rejected and same shall be replaced immediately by the supplier at BHEL or BHEL Customer site (wherever deficiency is observed) and necessary penal action will be taken as per BHEL norms.

6) Calibration records of all the measuring machines, instruments, gauges, fixtures etc. used for dimensional measurement shall be duly reviewed by BHEL/BHEL inspection agency before start of inspection .

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Part II: Requirement of clearance of 1st lot from BHEL:

1) First lot of item shall be supplied after meeting all QAP requirements to BHEL Bhopal and supply of subsequent lots shall be undertaken only after clearance of first lot by BHEL Bhopal.

2) Vendor has to initiate the supplies as per PO delivery only. Delay in supply of first lot of components or rejection of components due to any non-conformity/ quality deficiency shall not be considered as reason for delay in supply of components in subsequent deliveries as per PO delivery requirement.

3) Initial clearance of 1st lot of items does not absolve the supplier from supply of items as per drawing and specification requirement in subsequent lots.

Meaning of Legends: '#' - Supplier to submit test certificates & reports of above mentioned parameters.

Abbreviation: T P – Task Performer (Supplier), QC – Quality Control (QIX / BHEL appointed inspection agency)

Prepared by:	Approved by:		Issued by:
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BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL
QUALITY CONTROL TRANSPORTATION
QUALITY ASSURANCE PLAN (QAP)

QA Plan for casting/ rough machined cast components no. : QTM/QAP/VENDOR/13-14/001 Rev.10 Dt.: 28.05.2024

Part 1: Final inspection of the component before dispatch from vendor works (#)

Sl. No	Name of the process	Parameters for inspection	Quantum of check*		Mode of inspection/ equipment used	Drawing No./Spec./ Std.	Acceptance norms***	Requirement from supplier (See note 1)
			TP/Supplier	TPIA/QC**				
1	Casting for magnet frame, stator housing, stator chamber DE & NDE, suspension tube, rotor components (commutator hub, commutator 'v' ring, rotor end ring etc.) and bearing assembly components (end shields, wipers, bearing cap/ covers etc.)	Source of casting	100%	100%	Proof of source of casting	-	1. For components of TM type 6FRA6068/ 6FXA7059/ HS15250: • Casting manufacturer (in-house/ outsourced) shall be RDSO approved class 'A' foundry with valid certification. 2. For other components: • Casting manufacturer (in-house/ outsourced) shall be class 'A' foundry as listed in document no. TM22604 (annexure 1) or shall meet the qualifying criteria as per document no. TM22604 (annexure 1). • In case of outsourcing, quantity procured by supplier shall be verified from challan/ invoice for meeting the BHEL PO quantity.	In case of outsourcing: 1. Proof of source of casting to be provided to BHEL 2. Challan/ invoice to be provided to BHEL

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Sl. No	Name of the process	Parameters for inspection	Quantum of check*		Mode of inspection/ equipment used	Drawing No./Spec./ Std.	Acceptance norms***	Requirement from supplier (See note 1)
			TP/Supplier	TPIA/QC**				
2	Heat Treatment	Soaking temperature/ Soaking time	100%	100% TC to be verified	Temperature recorder/ Time temperature charts	Heat treatment requirement as per BHEL specification mentioned in the drawing	Mechanical properties as specified in the BHEL specification	Heat treatment report and graph to be provided to BHEL
3	Shot/Sand blasting	Casting surface finish	100%	20%	Instrument	As per BHEL drawing	Surface finish to be less than 50µm in 100% area except profile transition zone (Ref. IS: 3073)	Report of shot/sand blasting and surface finish to be provided to BHEL
4	Melt Analysis	Chemical composition mentioned in the BHEL specification /drawing	One sample per heat/ per heat treatment batch	100% TC to be verified	Spectrometer / Wet analysis method	As per BHEL drawing/ specification	As per BHEL drawing/specification	TC (from casting manufacturer or NABL accredited lab) to be provided to BHEL. Three test samples[$] per heat / per heat treatment batch is to be verified by TPIA (for heat & heat treatment batch punched by supplier matching with test certificate
5	Mechanical Testing	Mechanical properties mentioned in the BHEL specification /drawing	One sample per heat/ per heat treatment batch	100% TC to be verified	Mechanical testing equipment	As per BHEL drawing/ specification	As per BHEL drawing/specification	

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Sl. No	Name of the process	Parameters for inspection	Quantum of check*		Mode of inspection/ equipment used	Drawing No./Spec./ Std.	Acceptance norms***	Requirement from supplier (See note 1) reports above) to be provided to BHEL
			TP/Supplier	TPIA/QC**				

$: 1) In case item manufactured is by sand casting, 3 keel blocks (separately cast/integrally cast as per specification) to be supplied.
2) In case item manufactured is by investment casting, 3 test pieces of size Ø30 X 260 ±10 to be supplied.

6	Hardness checking on casting	Hardness limit mentioned in the BHEL specification/ drawing	20% of components/ Heat treatment batch / Lot	10% of components/ Heat treatment batch / Lot	Hardness testing equipment	As per BHEL drawing/ specification	As per BHEL drawing/specification	Hardness test report to be provided to BHEL
7	Identification Marking	Identification marking of casting manufacturer by embossing on castings on the location shown in drawing or location may be taken from BHEL Engg. Dept.	100%	100%	Visual	As per BHEL drawing/ specification TM12548	Identification marking as per BHEL drawing/specification TM12548	-
8	Dimensional Inspection	Cast dimensions	All drawing dimension of 100% component	All drawing dimension of 10% component	Instrument	As per BHEL drawing	1) **a) In case order is as per casting drawing:** As per BHEL drawing. **b) In case order is as per rough m/cd drawing**: As per BHEL drawing along with concentricity less than 1mm. **c) In case order is from finish machined**	Dimensional witness report to be provided to BHEL

Sl. No	Name of the process	Parameters for inspection	Quantum of check*		Mode of inspection/ equipment used	Drawing No./Spec./ Std.	Acceptance norms***	Requirement from supplier (See note 1)
			TP/Supplier	TPIA/QC**				
							drawing: 4(+/-0.5) mm machining allowances on each tool point along with concentricity less than 1mm.	
8	Dimensional Inspection	Rough machined dimensions	All drawing dimension of 100% component	All drawing dimension of 20% component	Instrument	As per BHEL drawing	**2)** Centre line on each job should be marked to ensure the cast, rough m/cd dimensions as per the casting, rough m/cd drawing requirement or machining allowance on each tool point of finish machined drawing.	Dimensional witness report to be provided to BHEL
9	Non Destructive Tests (NDT) (DP/MPI/UT)	DP/MPI/UT tests as mentioned in the BHEL drawing/ specification	100% (DP) or Sampling percentage as mentioned in the BHEL drawing / specification	20% (DP)	NDT equipment	As per BHEL drawing/ specification	As per BHEL drawing/ specification	NDT (DP/MPI/UT) report of 100% components or sampling percentage as mentioned in the BHEL drawing / specification shall be submitted along with consignment.
			100% (UT) or Sampling percentage as mentioned in the BHEL drawing / specification	20% (UT)				

Sl. No	Name of the process	Parameters for inspection	Quantum of check*		Mode of inspection/ equipment used	Drawing No./Spec./ Std.	Acceptance norms***	Requirement from supplier (See note 1) Report issuing inspector shall be ISNT/ASNT level-II in respective NDT test and reports shall be duly signed & stamped by inspector.
			TP/Supplier	TPIA/QC**				
			100% (MPI) or Sampling percentage as mentioned in the BHEL drawing / specification	20% (MPI)				
10	Non Destructive Tests (NDT) (Radiography)	Radiography tests as mentioned in the BHEL drawing/ specification	5% (Radiography) or Sampling percentage as mentioned in the BHEL drawing/ specification/ PO (whichever is higher. Subject to minimum 01 no./ set.	Witness & Verification of radiography report & films for correlation with components **Note:** In case of **suspension tube & steel ventilators**, TPIA/BHEL QC to identify the cast/rough machined suspension tube/steel ventilator serial nos. (embossed on casting) for	NDT equipment	As per BHEL drawing/ specification	As per BHEL drawing/ specification	Radiography report & films of 5% components or sampling percentage as mentioned in BHEL drawing / specification shall be submitted. Report issuing inspector shall be ISNT/ASNT level-II in radiography and reports shall be duly signed & stamped by inspector.

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Name of the process	Parameters for inspection	Quantum of check*		Mode of inspection/ equipment used	Drawing No./Spec./ Std.	Acceptance norms***	Requirement from supplier (See note 1)
		TP/Supplier	TPIA/QC**				
			radiography test. Radiography report & films during casting/ rough machining stage of suspension tube/steel ventilator (identified by TPIA/BHEL QC) shall be provided to BHEL for verification & approval Ω.				**Note**: In case of **suspension tube & steel ventilator**, radiography report & films shall be submitted during casting/ rough machining stage to BHEL for verification & approval Ω. Supplier shall also submit filled checklist as per page 3 of radiography process spec. no. BHEL/BPL/ QNDT/26 in compliance of the said spec. along with above.

Note:

1. BHEL reserve the right to carry out radiography test at BHEL Bhopal on randomly selected jobs or jobs for which radiography report & films have been submitted by the supplier for ensuring radiography requirement.
2. Ω Delay in supply due to non-clearance of castings/rough-machined castings because of any non-conformity observed in radiography report/films during verification at BHEL shall not be considered as reason for delay in supplies as per PO delivery requirement.

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Sl. No	Name of the process	Parameters for inspection	Quantum of check*		Mode of inspection/ equipment used	Drawing No./Spec./ Std.	Acceptance norms***	Requirement from supplier (See note 1)
			TP/Supplier	TPIA/QC**				
11	Visual Inspection	Component to be free from any abnormality such as blow hole, pin hole, dent etc.	100%	100%	Visual	As per BHEL drawing/ specification	Free from visual defect	-
12	Paint (Visual, Dry paint thickness and Adhesion test)	Inorganic ethyl zinc silicate primer paint (specification AA56113) on cast surfaces	100%	100% (Visual) & 10% per lot (DFT and adhesion test)	Visual and Instruments	As per relevant BHEL drawing/ specification TM94217 (latest revision)	As per relevant BHEL drawing/ specification TM94217	Report to be submitted for: • Visual • DFT • Adhesion
13	List of Calibration records of used measuring & Testing Equipment's	Calibration due date, accreditation status of master instruments	100%	100%	Verification	-	-	List of Calibration records of measuring and Testing instruments is to be provided to BHEL as per annexure-A.

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Notes:

1) All test records checked by TP, TPIA/QC (dully signed & sealed) as per above QAP requirement shall be submitted along with consignment.

2) Final acceptance will be based on inspection at BHEL, Bhopal.

3) (*) Quantum of inspection shall be in line with QAP unless otherwise mentioned in the drawing.

4) (**) Job shall be randomly selected from offered lot, the quantum of check (min. 1 no.) from the offered lot to be checked by TPIA or QC. (e.g.: If lot size is 2 then minimum one no is to be checked).

5) (***) Sample inspection of component does not mean that the supplier will not meet drawing & specification requirements in remaining components. In case any defect / non-conformance is observed at any stage (during processing or before and after fitment in any job),

Part II: Requirement of clearance of 1st lot from BHEL:

1) First lot of item shall be supplied after meeting all QAP requirements to BHEL Bhopal and supply of subsequent lots shall be undertaken only after clearance of first lot by BHEL Bhopal.

2) Vendor has to initiate the supplies as per PO delivery only. Delay in supply of first lot of components or rejection of components due to any non-conformity/ quality deficiency shall not be considered as reason for delay in supply of components in subsequent deliveries as per PO delivery requirement.

3) Initial clearance of 1st lot of items does not absolve the supplier from supply of items as per drawing and specification requirement in subsequent lots.

Meaning of Legends: '#' - Supplier to submit test certificates & reports of above mentioned parameters.

Abbreviation: TPIA –BHEL appointed third Party Inspecting Agency, T P – Task Performer (vendor), QC- Quality Control (QIX / BHEL appointed inspection agency)

Prepared by:	Approved by:		Issued by:
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600147/2024/HEP-TME40503

For uploading along with enquiry

Duly filled Technical Pre-Qualification Requirements to be submitted along with the offer by vendor

Ref No: TME/PQR/End Shield NDE_IM4507 Rev.00 Dated: 26/09/2024

Technical Pre-Qualification Requirements (PQR) for "End Shield NDE"

Vendor should comply with the following clauses (duly filled PQR shall be submitted along with the offer by vendor):

Cl. No.	Description	Vendor to comment	
		Complied / Not complied	Supporting relevant document to be submitted along with offer
1	Vendor shall supply "End Shield NDE" as per drawing no. mentioned in enquiry, without any deviation. Vendor shall ensure that "End Shield NDE" supplied confirms to quality requirements as per drawing & specification.	Yes/No	Compliance.
2	Vendor should be a machinist with in-house CNC machining & CMM (coordinate measuring machine) facility and not a trader.	Manufacturer/ Trader	Compliance.
3	Vendor to confirm that casting manufacturer shall meet following criteria: (a) Casting manufacturer should be Class- 'A' foundry (as per IS: 12117: 1996) listed in Annexure-1 of document no. TM22604 Rev.01 (copy attached). OR (b) Casting manufacturer should meet requirement of SG iron casting/ Carbon steel casting (as per material of enquired item) as per Annexure-2 of document no. TM22604 Rev.01 (copy attached).	(a) Yes/No OR (b) Yes/ No	(a) Compliance. OR (b) (i) Name of casting manufacturer to be specified. (ii) Vendor to submit Casting manufacturer's clause wise compliance and supporting relevant document for Annexure-2 of document no. TM22604 Rev.01 with seal and sign of casting manufacturer and vendor on each page.
4	a) Vendor to confirm having CNC machine facility suitable for job involving turning operation of minimum 820 mm diameter (with capacity of holding min. 1003mm diameter) and CNC machine for milling operation suitable for enquired item, available at its works on the date of enquiry.	Yes/No	Vendor to highlight details (i.e. model, make, year of commissioning, range of turning, accuracy etc.) of CNC machine suitable for job involving turning operation of minimum 820 mm diameter (with capacity of holding min. 1003mm diameter) and CNC machine for milling operation suitable for enquired item, available at its works on the date of enquiry.

600147/2024/HEP-TME40503

For uploading along with enquiry

Duly filled Technical Pre-Qualification Requirements to be submitted along with the offer by vendor

Ref No: TME/PQR/End Shield NDE_IM4507 Rev.00 Dated: 26/09/2024

Technical Pre-Qualification Requirements (PQR) for "End Shield NDE"

Cl. No.	Description	Vendor to comment	
		Complied / Not complied	**Supporting relevant document to be submitted along with offer**
	b) Vendor to confirm having 3D-CMM facility **with min. accuracy of 20 microns**, at its works, suitable for measuring enquired item.	Yes/No	Vendor to highlight details (i.e. model, make, year of commissioning, range, accuracy etc.) of 3D-CMM facility ***with min. accuracy of 20 microns***, available at its works, suitable for measuring enquired item.
5	a) Vendor shall confirm compliance of QA plan no.TM12545 rev.09.	Yes/No	Compliance.
	b) Vendor to confirm submission of 3D CMM report of End Shield NDE along with the consignment as per QA plan (TM 12545 rev.09) requirement.	Yes/No	Compliance.
6	Vendor should have past experience of successfully machining & supplying any component, involving turning operation of diameter 820 mm or more as well as milling operation on the same job, in preceding 5 years from enquiry opening date. Vendor to ensure that documents submitted against b), c) shall correlate with the submitted PO copy.	Yes/No	a. PO copies. b. Drawing of supplied item. c. Supply proof i.e. invoice.
7	For verification of information furnished by vendor, additional documents proofs etc. may be required by BHEL. Vendor to confirm providing the same.	Yes/No	Compliance.

Notes:

1. Compliance of all the points in above T-PQR is mandatory. In absence of compliance of above, vendor's offer is liable to be rejected.
2. Information / compliance / documents submitted by vendor shall be authentic in all aspects. In case any deviation / false information / forged documents are observed, BHEL is free to initiate appropriate punitive proceeding against the supplier

Important: This document is to be filled and submitted along with the offer. This document must be signed by authorized representative of the vendor and should contain the name of representative & seal of the company.

	BHEL	PRODUCT STANDARD TME DIVISION, BHOPAL	TM 22604 Rev.01
	TME/2011		PAGE 01 OF 14

List of class "A" foundry as per IS12117:1996 / Process that shall be followed & facility that shall be available with casting manufacturer for qualification in list of Class "A" foundry (For both Carbon steel & SG Iron casting)

1.0 Scope:

For Cast components of machines (other than 6FRA6068/ 6FXA7059/ HS15250) casting manufacturer (in-house/ outsourced) shall be class 'A' foundry as listed in annexure 1.

Or

Casting manufacturer (in-house/ outsourced) shall meet the qualifying criteria as per annexure 2.

2.0 This specification contains following annexures:

2.1 Annexure 1:

List of Class "A" Foundry (as per IS:12117:1996).

2.2 Annexure 2:

The process that shall be followed & facility that shall be available with Carbon steel & SG Iron casting manufacturer for qualification in list of Class "A" foundry.

Revision : 00 **Date : 22.09.2022**	**Distribution**	**Qty.**	**Approved :** 29/05/24 **(Manish Verma)**		
	TXM,TAM **TGM,TNX** **QMX,TME**	**1,1** **1,1** **1,1**	**Prepared** **(A. Jain)**	**Checked** **(R. Chaudhry)**	**Date** 29.05.24

ANNEXURE 1

List of Class "A" Foundry (as per IS:12117:1996)

Sl. No.	Vendor	Works
1	M/s Siena Engineering Pvt. Ltd.-Indore Regd Add.- 303, Navneet Plaza 5/2 old Palasia Indore, Madhya Pradesh-452018, India	Plot No.- 18A-22 and S-3/3,Sector-III,Sagore Kutti Road, Pithampur, Dhar, Madhya Pradesh-454775,India
2	M/s A.D.Electro Steel Co. Pvt Ltd-Kolkata Regd Add.-Chatterjee international centre 33A, Jawahar Lal Nehru road, 22nd floor Kolkata,West Bengal-700071, India	Baltikuri (Surkimill) Kalitala Howrah, West Bengal-711113, India
3	M/s Frontier Alloy Steels Ltd- Kanpur Reg Add.-KM 25/5 And 6, Kalpi Road Rania Kanpur, Uttar Pradesh-209304, India	Unit-I KM 25/5 & 6, Kalpi Road, Rania, Kanpur Dehat-209304 Kanpur Dehat, Uttar Pradesh-209304, India Unit-II Unit-II Jamni Wala Road, Jamboo Khala, Tehsil Paonta Sahib Sirmaur, Himachal Pradesh-173025 India
4	M/s NF Forgings Pvt Ltd-Kolkata Reg Add: 28 Strand Road 3rd Floor Kolkata West Bengal-700001 India	Dhulagarh Industrial Park NH-6 (Bombay Road), Dhulgarh, Sankrail Howrah, West Bengal-711302, India
5	M/s HEMCO Engineering Private Limited-Bhind Regd Add:Industrial Estate Birlanagar Gwalior, Madhya Pradesh-474004, India	53, Industrial Area, Malanpur Bhind, Madhya Pradesh-477117, India
6	M/s Kharagpur Metal Reforming Industries Pvt Ltd-Kharagpur Regd Add:- Koushallya Kharagpur Paschim Midnapore, West Bengal-721301, India	Works_1: Vill & PO-Khatranga, PS-Kharagpue Local, Kharagpur, West Bengal-721149, India Works_2:-Koushallya Kharagpur Paschim Midnapore, West Bengal-721301, India
7	M/s Sarita Forgings Limited-Ludhiana Regd Add: 15/137, Miller Ganj, Near Jandu Tower G.T Road, Ludhiana Punjab-141003 India	2 KM Mile stone G.T Road, Village-Rajgarh, Doraha, Unit-II: HB no. 243, Village Rajgarh, Tehsil Payal, Doraha Ludhiana, Punjab 141421 India
8	M/s Raneka Industries Ltd Pithampur, (Dist) Dhar Regd Add: Plot No. 16 & 17, Sector-III Sector-3 (Sagore)Pithampur Dhar Madhya Pradesh-454774, India	Plot No. 15,16 & 17, Sector-3 (Sagore)Pithampur Dhar Madhya Pradesh-454775, India

Sl. No.	Vendor	Works
9	M/s Atul Engineering Udhyog-Agra Reg Add-: Nunhai Agra Uttar Pradesh-282006-India	Nunhai Agra Uttar Pradesh-282006-India
10	M/s Someshwar Castings Pvt Ltd-Allahabad Regd Add:- 392/621 Muthiganj Allahabad Uttar Pradesh-211006,India	C-8 UPSIDC Industrial Area, Naini, Allahabad, Uttar Pradesh-211010 India
11	M/s Chandra Udyog-Howrah Regd Add:-Ichapur Road (Sealdanga), Kalitala P.O. Santragachi, Howrah-West Bengal-711104, India	NH-6 Salap, Mathbagan, Domjur, Howrah, West Bengal-711409 India
12	M/s Orient Steel and Industries Ltd Kolkata Regd Add: 2 Brabourne Road Kolkata West Bengal-700001, India	9, Gopal Ram Pathak Raod, Liluah Howrah, West Bengal-711204 India
13	M/s Hindustan Engineering And Industries Ltd Kolkata Reg Add: MODY BUILDING 27 Sir R.N. Mukherjee Road Kolkata, West Bengal-700001,India	BAMUNARI PLANT NH-2 Delhi Road Hoogly, West Bengal-712250 India
14	M/s Brand Alloys Private Limited-Kolkata Reg Add: 37, Shakespeare Sarani, 4th Floor Kolkata West Bengal-700017, India	NH-2 Delhi Road Chatra Sreerampore Hooghly West Bengal-712223, India
15	M/s Rine Engineering Pvt Ltd-Baddi Regd Add: Plot No. 73 A, B, &C HPSIDC Indl Area, Baddi Solan, Himachal Pradesh-173205,India	RN Plot No. 73 A, B, &C HPSIDC Indl. Area, Baddi Solan, Himachal Pradesh-173205,India
16	M/s BESCO Limited-Kolkata Regd Add: "Poonam",7th Floor, 5/2, Russell Street Kolkata West Bengal-700071 India	Baruipur, 24 Parganas (South), Kolkata 24 Parganas. West Bengal-700144. India
17	M/s Jagdamba Liquified Steels Ltd- Haridwar Reg Add: 16-17 km milestone roorkee saharanpur road Village -Raipur Haridwar Uttarakhand-247661 India	16-17 km Milestone,Roorkee saharanpur road Village - Raipur Haridwar Uttarakhand-247661 India
18	M/s Modern Insulators Ltd-Aburoad Reg Add: Post Box No.23 Abu Road Sirohi, Rajasthan-307026 India	Post Box No.23 Abu Road, Rajasthan-307026 India
19	M/s Precision Industrial Systems- Gwalior Reg Add: 16, Industrial Area, Tansen Road Gwalior Madhya Pradesh-474004 India	16, Industrial Area, Tansen Road Gwalior Madhya Pradesh-474004 India
20	M/s Porwal Auto Components Limited-Pithampur Regd Add: Plot No. 209, Industrial Area Sector-1 Pithampur Dhar, Madhya Pradesh-454775,India	Plot No. 209 & 215, Industrial Area Sector-1 Pithampur Dhar, Madhya Pradesh-454775,India

Sl. No.	Vendor	Works
21	M/s Jayaswal Neco Industries Limited- Nagpur Regd Add: F-8 MIDC Industrial Area Hingna Road Nagpur Maharastra-440016, India	T-41/42, MIDC Industrial Area, Hingna Road Nagpur,Maharastra-440016,India
22	M/s Simplex Castings Limited-Bhilai Regd Add: 32 Shivnath Complex G.E. Road, Supela Bhilai Chhattisgarh-490023 India	5A, Light Industrial Area Bhilai Chhatisgarh-490023 India
23	M/s Titagarh Steels Limited-Kolkata Regd Add: 113 Park Street 10 th floor Kolkata West Bengal-700016 India	1, Abdul Quddus Road Titagarh, 24 Paragana West Bengal-700107, India
24	M/s Bhilai Engineering Corporation Limited-Bhilai Reg Add: Hathkhoj, Industrial Area, Bhilai, Chhatisgarh-490026 India	Hathkhoj, Industrial Area, Bhilai, Chhatisgarh-490026 India
25	M/s RBA FERRO Industries Pvt Limited-Kolkata Reg Add: 2/6 Sarat Bose Road Central Plaza Suite no. 808 Kolkata West Bengal-700020,India	NH-6 Vill & P.O. Prasastha P.S. Domjur, Howrah. West Bengal-711302 India
26	M/s Titagarh Wagons Limited-Kolkata Regd Add: Titagarh Tower, 756 Anandpur EM Bypass Kolkata, West Bengal-700107	Heavy Engineering Division, PO-Hind Motor Hooghly, West Bengal-712233 India
27	M/s Kalimata Ispat Industries Pvt Ltd Kolkata Regd Add: 14/2 Old China Bazar Street, 3rd floor Room No.213 Kolkata, West Bengal-700001, India	Kalimata Ispat Industries Pvt Ltd, Plot No. 1/98, Bidhan Road, Vill-Sahebdihi, P.O.-Hatashuria PS-Borjora Bankura, West Bengal-722004, India
28	M/s Air Control and Chemical Engg Co Ltd-Ahmedabad Regd Add: Barejadi W.Rly , Post Nandej, Ahmedabad Gujarat-382435 India	ACCECL Barejadi W.Rly , Post Nandej, Ahmedabad Gujarat-382435 India
29	M/s AFFINE Steels Pvt Ltd-Haridwar Reg Add: Sector-7, Plot No.98, IIE Ranipur, Sidcul, Haridwar, Uttarakhand-249403 India	Sector-7 Plot No 98, IIE Ranipur, Sidcul, Haridwar, Uttarakhand-249403, India
30	M/s N.K.Iron Industires-Agra Reg Add: C-3 Foundry Nagar Hathras Road Agra, Uttar Pradesh-282006 India	C-3 Foundry Nagar Hathras Road Agra, Uttar Pradesh-282006 India
31	M/s GNAT Foundry Pvt Ltd Kolhapur Reg Add: 4/1, MIDC Shiroli Kolhapur Maharastra-416122, India	4/1, MIDC Shiroli Kolhapur Maharastra-416122, India
32	M/s Abha Power And Steel Pvt Ltd Bilaspur Regd Add: Sadar Bazar Bilaspur, Chhatisgarh-495001 India	Silpahari Industrial area Hardiala Bilaspur Chhatisgarh-495001 India

Sl. No.	Vendor	Works
33	M/s Rausheena Udyog Limited-Kolkata Regd Add: INFINITY Think Tank Tower-II 10 th Floor Plot A3, Block-GP Sector-V Salt Lake Kolkata West Bengal-700091 India	Chaygon Industrial Growth Centre. Village-Chatabari, P.O.-Birpara Kamrup, Assam-781123 India
34	M/s Calcutta Springs Limited -Kolkata Regd Add: 18, R.N Mukherjee Road 4th floor Calcutta, West Bengal-700001,India	Village-Alampur, P.O. New kolorah NH-6, Howrah, West Bengal-711302 India
35	M/s Vossloh Beekay castings Limited Bhilai Regd Add: 25-28, Light Industrial Area Bhilai, Chattisgarh-490026	Unit-1 (Plot no. 25,26A,27 & 28), Light Industrial Area, Bhilai, Chattisgarh-490026,India
36	M/s A.K.Multimetals Pvt Ltd- Mandi Gobindgarh Regd Add: A-1 Focal Point, Mandi Govindgarh Mandi Govindgarh Punjab-147301,India	A-1 Focal Point, Mandi Govindgarh Punjab-147301,India
37	M/s KVS Castings Pvt Ltd-Kashipur Regd Add: B-25-29 Industrial Estate, Bazpur Road, Kashipur, Uttarakhand-244713 India	KVS B-25-29 Industrial Estate, Bazpur Road, Kashipur, Uttarakhand-244713 India
38	M/s Voestalpine Vae VKN india Pvt LTd, Delhi Regd Add: 24/5, Sri Ram Road, Civil Lines Delhi-110054 India	Voestalpine 42, Mile Stone G.T.Road, Bahalgarh Sonepat, Haryana-131021 India
39	M/s Jugal Kishore Alloys -Lucknow Regd Add: 13 A Rana Pratap Marg Old YMCA Complex Lucknow Uttar Pradesh-226010 India	Faizabad Road, Vill Semra Chinhat, Lucknow Uttar Pradesh-226028 India
40	M/s Eastern Alloys Pvt Ltd-Rourkela Regd Add: Goibhanga P.O.Kalunga, Dist:Roukhela Sundargarh Rourkela Odisha-770031 India	Goibhanga P.O.Kalunga, Dist:Roukhela Sundargarh Rourkhela Odhisha-770031 India
41	M/s Saurabh Metals Pvt Ltd-Bhopal Regd Add: 45, Ancillary Industrial Estate Habibganj Bhopal Madhya Pradesh-462024,India	Plot No.22 New Industrial Area Mandideep Raisen Madhya Pradesh-462026 India
42	M/s JAI MULTI ENGINEERING CO.-DERA BASSI Regd. Add.: Village-Bhagwanpura, Barwala Road, Teh. Derabassi, Mohali, Punjab-140507, India	Village-Bhagwanpura, Barwala Road, Teh. Derabassi, Mohali, Punjab-140507, India
43	M/s NATRAJ IRON AND CASTINGS PVT. LIMITED-PATNA Regd Add.: 146 PATLIPUTRA COLONY PATNA, Bihar-800013,India	Village- Laikdih, Chirkunda Dhanbad, Jharkhand-826003, India
44	M/s NAVANIRMAN FABRICATION PRIVATE LIMITED-KOLKATA Regd Add.: 39/1/1A,Canal West Road,Kolkata,West Bengal-700004,India	Vill-Chakundi,Dag No. 119,121-125, 586, 588, 590, P.O.-Dankuni Coal Complex Hoogly,West Bengal-712310,Indiua

Sl. No.	Vendor	Works
45	M/s STEELCAST LIMITED- BHAVNAGAR Regd Add.: Ruvapari road Bhavnagar, Gujarat-364005,India	Ruvapari road Bhavnagar,West Bengal-364005,India
46	M/s VIGNYAN INDUSTRIES LTD-TARIKERE Regd Add.: P. B. No.4, B.H. ROAD, AT/PO Tarikere,Distt.- Chikmagalur Tarikere, Karnataka-577228,India	P. B. No.4, B.H. ROAD, AT/PO Tarikere Chikmagalur, Karnataka-577228,India
47	M/s BURN STANDARD CO. LTD. KOLKATA Regd Add.: 22-B, Raja Santosh Road, Alipore Kolkata, West Bengal-700027,India	Howrah works,20-22, Nityadhan Mukherjee Road, Howrah, West Bengal-711001, India
48	M/s R V CASTING AND ENGINEERING PVT LTD-FARIDABAD Regd Add.: H.no. 1371-72,sector 14 Faridabad, Haryana-121005, India	RV Village-Piyala, Ballabhgarh,Faridabad,Haryana-121004,India
49	M/s TEXMACO RAIL AND ENGINEERING LIMITED-KOLKATA Regd Add.: P.O. Belgharia, (Agarpara Works) Kolkata, West Bengal-700056,India	Works 1: Belgharia, 24- Parganas Kolkata, West Bengal-700056,India Works 2: Plot No 750 URLA Industrial Estate Ring Road No 2, Village Sarora Raipur, Chhattisgarh-493221, India
50	M/s JUPITER WAGONS LIMITED-KOLKATA Regd Add.: 4/2, Middleton Street Kolkata,West Bengal-700001,India	Shahgunj, Chinsurah,Bandel, Hoogly, West Bengal-712104,India
51	M/s ASANSOL STEEL CASTINGS PRIVATE LIMITED-HOWRAH Regd Add.: 29/1 Kalabagan Lane, Block-2, Lemon Fresh,2nd Floor, Howrah, Howrah,West Bengal-711104,India	Sripur Village Road, P.O.- Ningha Asansol, Distt.- Bardhman Badhman, West Bengal-713370,India
52	M/s CHITTARANJAN LOCOMOTIVE WORKS WEST BENGAL-CHITTARANJAN Regd Add.: Chittaranjan Distt.-Burdwan Chittaranjan,West Bengal-713331,India	Steel Foundry Chittaranjan Burdwan,West Bengal-713331,India
53	M/s PITTI CASTINGS PVT LTD-HYDERABAD Regd Add.: 6-3-648/401,4th floor, Padmaja Landmark, Somajiguda, Hyderabad, Telangana-500082,India	Sy No. 53, Macharam Village, Balanagar Mandal, Mahabubnagar Hyderabad, Telangana-509202, India
54	M/s BHUPENDRA STEELS PRIVATE LIMITED-FARIDABAD Regd Add.: 1098,Basement,Chitranjan Park,New Delhi,Delhi-110001,India	Plot No. 25,Sector-6 Faridabad, Haryana-121006,India
55	M/s BRAITHWAITE AND CO. LIMITED KOLKATA Regd Add.: 5, Hide Road Kolkata,West Bengal-700043,India	Angus Works P.O. Angus,Angus,West Bengal-712221,India

Sl. No.	Vendor	Works
56	M/s AUTOKAST LIMITED-KERALA Regd Add.: S.N.Puram,P.O. Cherathala, Alapuzha Dist,S.N.Puram,Kerala-688582,India	S.N.Puram,P.O. Cherathala, Alapuzha,Kerala-688582,India
57	M/s KALYANI CAST TECH PRIVATE LIMITED-REWARI Regd Add.- PT-62/9, Ground Floor,Kalkaji Extension, Delhi, Delhi-110019,India	Kalyani Village-Mamria, Thether Rewari,Haryana-123101,India
58	M/s CAST PROFILES PRIVATE LTD-ROURKELA Regd Add.: Industrial Estate, Kalunga-Rourkela, Odisha-770031,India	Industrial Estate, Kalunga-Rourkela, Odisha-770031,India
59	M/s CHANDEL ENGINEERING PVT. LTD.-KANPUR Regd Add.: 122/20, Sarojini Nagar Kanpur,Uttar Pradesh-208012-India	1-A, K.D.A Industrial Area, Panki, Site-1, Kanpur, Uttar Pradesh-208022,India
60	M/s ORIENTAL FOUNDRY PRIVATE LIMITED-KUTCH Regd Add.: Shop.- 17 Rizvi Park Co Op-Society,E wing, SV Road, Sant Cruz(W), Mumbai, Maharashtra-400054,India	Survey No.-442 & 455/P23, Vill- Chopadava, Tal, Bhachau,Gujarat-370165,India
61	M/s PROMPT CAST MECH PVT LTD.-KOLKATA Regd Add.: HOWRAH-AMTA ROAD, BALITIKURI,SIBTALA,HOWRAH,West Bengal-711113,India	CHINSURAH-DHANIAKHALI ROAD,LAND MARK NEAR BENTAR MORE,SINHET,P.S-DADPUR,HOOGHLY,West Bengal-712305,India
62	M/s NIPHA EXPORTS PRIVATE LIMITED-KOLKATA Regd Add.: 48,Ganga Jamuna, 28/1, Shakespeare Sarani Kolkata, West Bengal-700017,India	NH-2, Delhi Road, Vill- Dakshin Rajyadharpur, P.O. Serampore, West Bengal-712201,India
63	M/s OMBESCO RAIL PRODUCTS LIMITED-DHANBAD Regd Add.: 2B, Grant Lane,1st Floor, Room No.-106 Kolkata, Jharkhand-700012,India	P.O. Mugma, P.S. Nirsa, Dhanbad, Jharkhand-828204,India
64	M/s GALLARD STEEL LIMITED-INDORE Regd Add.: Ground Floor, 168M Sukh Sneh Appartment, Khatiwala Tank, Indore,Madhya Pradesh-452014, India	Plot No. 66, Sector 3, INDORAMA, Pithampur, Madhya Pradesh- 454775, India
65	M/s PRRAGATHI STEEL CASTINGS PVT LTD-SHIMOGA Regd Add.: No. 41 & 42 Shivamogga-Bhadravathi Industrial Area, Machenahalli, Nidige Post, Shivamogga-577222 Shivamogga, Karnataka-577222, India	No. 41 & 42 Shivamogga-Bhadravathi Industrial Area, Machenahalli, Nidige Post, Shivamogga, Karnataka-577222, India

Sl. No.	Vendor	Works
66	M/s WESTPOINT INDUSTRIES-PANCHKULA Regd Add.: Plot No.66, Industrial Area, Phase 1, Panchkula, Haryana-134113,India	Plot No. 66, Industrial Area, Phase 1, Panchkula, Haryana-134113, India
67	M/s HYPER STEEL CASTING PRIVATE LIMITED-RAISEN Regd Add.: PLOT NO 19 20,SECTOR-B, INDUSTRIAL AREA, MANDIDEEP,RAISEN, Madhya Pradesh-462046,India	Plot No. 19 & 20,Sector -B, Industrial Area, Mandideep,Raisen, Madhya Pradesh-462046,India
68	M/s UMASHAKTI STEELS PRIVATE LIMITED-U.S.NAGAR Regd Add.: VILL.VIKRAMPUR PO.BAZPUR U.S.NAGAR,Uttarakhand-262401,India	Vill.Vikrampur PO.Bazpur, Distt.-U.S.Nagar,Uttarakhand-262401,India
69	M/s MAA FOUNDRY PRIVATE LIMITED-SUNDARGARH Regd Add.: Plot No.-515, Chikatmati, Kalunga-770031,Rourkela Rourkela,Odisha -770031,India	Plot No.-515, Chikatmati, Kalunga-770031,Rourkela Rourkela,Odisha -770031,India
70	M/s MANIS FOUNDRIES PVT LTD-DINDIGUL Red Add.: New No. 75,4th Street. Padmanabha Nagar, Adayar Chennai, Tamil Nadu-600020,India	SF No. 211,274 Urallipatty VelverKotteri (Post) Dindigu,Tamil Nadu-624803,India
71	M/s SANMAR MATRIX METALS LIMITED PUDUKOTTAI Regd Add.: 9 Catherdral Road, Chennai, Tamil Nadu-600086, India	87/1, Vadugapatti Village, Viralimalai Pudukottai, Tamil Nadu- 621316,India
72	M/s YAJURDEV ENGINEERING PRIVATE LIMITED-ROORKEE Regd Add.: KHASRA NO. 135,139 VILLAGE TANSIPUR,ROORKEE Haridwar, Uttarakhand-247656,India	Khasra No. 135 & 139 Village- Tansipur,Roorkee Haridwar, Uttarakhand- 247656,India
73	M/s DATRE CORPORATION LIMITED-KOLKATA Regd Add.: 60A,DIAMOND HARBOUR ROAD, THAKURPUKUR KOLKATA,West Bengal-700063,India	Sector III, Falta Industrial Growth Centre 24 Parganas(S),West Bengal-743504, India
74	M/s SREE SHIVA SAI CAST PVT LTD-SHIVAMOGGA Regd Add.: Survey No.57, Gejjenahalli, Kote Gangoor (Post), Shivamogga, Karnataka-577204, India	Survey No.57, Gejjenahalli, Kote Gangoor (Post), Shivamogga, Karnataka-577204, India
75	M/s SHREE KEDAR METAL FOUNDRIES-SANGLI Regd Add.: Gat no-49,Near Industrial Estate Palus Sangli,Maharashtra-416310,India	Gat no-49, A/P Palus Sangli,Maharashtra-416310,India

Sl. No.	Vendor	Works
76	M/s ETA MANUFACTURERS PRIVATE LIMITED-PASCHIM BURDWAN Regd Add.- 1, Dr. M.N. Ghosh Road, P.O.: Raniganj,Raniganj, West Bengal-713347,India	Suri Road, NH-60, Vill- Dhasal,Dist.:Paschim Bardhaman,P.S. Jamuria, P.O. Bahadurpur Bardhaman, West Bengal- 713362,India
77	M/s SHREE BANKEY BIHARI UDYOG-AGRA Regd. Add.-10/9B KATRA WAZIR KHAN, RAMBAGH AGRA,Uttar Pradesh-282006, India	10/9B KATRA WAZIR KHAN, RAMBAGH AGRA,Uttar Pradesh-282006, India
78	M/s R.G. Industries- Jalandhar Regd. Add.- VILL-FAZALPUR, BACKSIDE FOCAL POINT NEAR RANDHAWA MASANDA JALANDHAR, Punjab-144004,India	Vill-Fazalpur, Behind Focal Point near Randhawa Masandan, Jalandhar-Jalandhar, Punjab-144004,India
79	M/s Behari Lal Ispat Pvt. Ltd-Fatehgarh Sahib Regd Add.-Village Salani,Amloh Road Mandi Gobindgarh Fatehgarh Sahib, Punjab-147301,India	Village Salani,Amloh Road Mandi Gobindgarh, Punjab-147301,India
80	M/s SRS Alloys Private Limited-Tumkur Regd Add.- Plot No.43, Hirehalli Industrial Area, Tumkur,Karnataka-572168, India	Plot No.43, Hirehalli Industrial Area, Tumkur,Karnataka-572168, India
81	M/s Universal Autofoundry Ltd.-Jaipur Regd Add.- B-307,Road No.16,V.K.I. Area Jaipur, Rajasthan-302013,India	B-51, S.K.S. Industrial Area, Reengus, Sikar, Rajasthan-332404,India
82	M/s Neotech Foundries Regd Add.- 88-H,Industrial Estate, Bhilai-490026, Chhattisgarh Bhilai, Chhattisgarh-490026, India	88-H, Industrial Estate, Bhilai-490026, Chhattisgarh, Bhilai, Chhattisgarh-490026,India
83	M/s PARUCCO FOUNDRY PRIVATE LIMITED-HOOGHLY Regd Add.- 142/1 G.T. ROAD, BOWBAZAR, CHATRA SERAMPORE HOOGHLY, West Bengal-712204, India	PFPL DHOBAPUKUR,P.O. BIGHATI, P.S. BHADRESWAR HOOGHLY,West Bengal-712124,India Capacity (PA): 11392 MT
84	M/s Electro Magnetic Industries (Foundry Division) Regd Add.- Plot No. 1, Unit-II, Vadodara,Gujarat-391243,India	Block No. 621,622/B, At Avakhal,Taluka-Sinor, Vadodara, Gujarat-391250,India
85	M/s Fortune Foundries Pvt. Ltd. Regd Add. - Plot No. B-83 Five Star MIDC,Kagal, Tal- Hatkanagale,Kagal Kolhapur,Maharashtra-416236,India	Plot No. B-83 Five Star MIDC,Kagal, Tal Hatkanagale, Kagal Kolhapur,Maharashtra-416236,India

Annexure-2

The process that shall be followed & facility that shall be available with Carbon steel & SG Iron casting manufacturer are as given below. Supplier to furnish compliance/details as detailed below along with offer unless otherwise mentioned.

Sl. no.	Details of Process / Facility	Complied/ Not complied	Supporting relevant document to be submitted
1.0	**General:**		
1.1	A list of approved vendors or sub-contractors exists for all the important foundry inputs and the same is periodically up-dated.		Not required
1.2	There are comprehensive specifications for all the important bought-out materials.		Specification of sand, binder for mould sand and mould paint
1.3	Supplier to confirm use of sand of AFS 40-50 or fine.		Supporting documents along with consignment for use of AFS 40-50 sand or fine sand
1.4	There is an operating system of the important incoming materials and inputs being inspected and cleared prior to their issue to the floor and the authority for clearing such materials is defined and the results of such inspection are documented.		Not required
2.0	**Process Engineering (Methods)/Patterns:**		
2.1.	There is a person working exclusively in this area satisfying the following requirement: **a)** At least a Bachelor's degree in Mechanical/Metallurgical/ Foundry Engineering, and having not less than 5 years relevant experience. or **b)** A Diploma in Mechanical/Metallurgical/ Foundry Engineering with at least 10 years relevant experience.		Details of persons in support shall be furnished

Sl. no.	Details of Process / Facility	Complied/ Not complied	Supporting relevant document to be submitted
2.2	For each job (concerning each pattern number), the following exist duly documented: **a)** Pattern design **b)** Gating and risering design **c)** Molding materials and methods **d)** Pouring temperature **e)** Heat treatment cycle **f)** Applicable test piece, where relevant **g)** Casting identification **h)** Special instructions, where relevant, concerning shakeout, gas cutting, welding procedure etc.		Sample process sheet
2.3	A procedure exists providing for decision making and written instructions concerning corrective actions to be taken against deviations in dimensions and quality, after the sample or pilot casting is made and the implementation of such instructions is also recorded.		Not required
2.4	The pattern to be used for the manufacturing of carbon steel & SG Iron castings shall be made from Aluminium/steel.		Photographs of pattern used shall be provided along with consignment
3.0	**Melting:**		
3.1	**For Carbon steel castings:** **i)** Inhouse melting facility for carbon steel.		Furnace make, model, capacity etc. along with photograph
3.2	**For SG Iron castings:** **i)** Inhouse melting facility for SG Iron.		Furnace make, model, capacity etc. along with photograph
	ii) Vendor shall have magnesium treatment facility like Tundish Ladle etc. Vendor to specify inhouse facility available for magnesium treatment.		Make, model, capacity etc. along with photograph

Sl. no.	Details of Process / Facility	Complied/ Not complied	Supporting relevant document to be submitted
3.3	An immersion pyrometer exists for measuring temperature of liquid metal.		Photograph of facility
3.4	Temperature of the liquid metal is actually measured before tapping and is recorded for each melt.		Not required
3.5	The temperature measuring equipment is calibrated at least once in three months or more often.		Calibration record
3.6	Each melt is analyzed and ensured to be in compliance with the specification before tapping.		Not required
4.0	**Casting:**		
4.1	A satisfactorily operating system of identifying each piece of casting, where relevant, so as to be able to trace it back to its melt number or heat-treatment batch number, exists.		Not required
5.0	**Heat Treatment:**		
5.1	Adequate capacity exists for in-house heat treatment of all the castings produced in the foundry.		Make, model, capacity etc. along with photograph
5.2	The heat-treatment furnaces are equipped with multi-point automatic continuous temperature recording arrangement, covering the different relevant furnace zones.		Not required
5.3	Each of the heat-treatment furnaces has been calibrated using a sufficient number of thermocouples to know the prevailing temperatures in different zones at different temperature ranges.		Calibration record
5.4	The thermocouples, temperature indicators and the recorders are calibrated at a frequency of at least once in 6 months.		Calibration record
5.5	Test bars accompany the relevant castings during heat treatment, and the log sheet or other documents concerning each heat treatment batch reflect the particulars of such test bars accompanying the batch.		Log sheet / other supporting document

Sl. no.	Details of Process / Facility	Complied/ Not complied	Supporting relevant document to be submitted
6.0	**Fettling:**		
6.1	Shot blasting equipment exists which has a size and capacity commensurate with the type and quantity of the product range handled.		Make, model, capacity etc. along with photograph
7.0	**Final Inspection:**		
7.1	The following in-house facilities exist for carrying out the necessary inspection/testing: a) Magnetic particle inspection in accordance with IS 10724 : 1990		Make, model, capacity etc. along with photograph of each facility
7.2	The inspection personnel conducting the above non-destructive testing is adequately trained and qualified by a recognized agency and has adequate experience.		Not required
7.3	Separate standardized forms exist for recording the results of different kinds of non-destructive tests carried out, including a provision for indicating the deviations on a sketch of the relevant part of the castings.		Sample NDT reports
8.0	**Metallurgical & Laboratory:**		
8.1	The person in-charge of the metallurgical area is at least a Graduate Metallurgical Engineer with not less than 5 years of relevant experience.		Details of persons in support shall be furnished
8.2	The staff conducting tests like chemical analysis, sand testing, testing of mechanical properties etc. have adequate skill and competence and have undergone sufficient training to give them reasonable reliability.		Not required
8.3	The following testing facilities exists: **a)** Direct reading vacuum emission spectrometer, or any other equipment with at least equivalent speed and accuracy. **b)** Tensile testing equipment with a minimum of 20 tonne of load capacity. **c)** Fixed bench type or other heavy type equipment for carrying out hardness testing, that is, BHN/ HRC/ VPN. **d)** Portable hardness tester of at least one type, other than Poldi. **e)** Satisfactory photomicrography equipment.		Make, model, capacity etc. along with photograph of each facility

Sl. no.	Details of Process / Facility	Complied/ Not complied	Supporting relevant document to be submitted
8.4	Adequate standard samples are available for daily calibration of the method of chemical analysis followed.		Photograph of samples
9.0	**Past Experience:**		
9.1	Supplier shall have past experience of manufacturing & supply of Carbon steel castings to Traction motor manufacturer / Indian Railways, in last 5 years.		a) PO copy. b) Drawing of supplied item. c) Material test certificate. d) Supply proof i.e. invoice.
9.2	Supplier shall have past experience of manufacturing & supply of SG Iron castings to Traction motor manufacturer / Indian Railways, in last 5 years.		a) PO copy. b) Drawing of supplied item. c) Material test certificate. d) Supply proof i.e. invoice.

Notes:

1. Compliance of all the points in above document is mandatory. In absence of compliance of above & non-submission of documents required against annexure-1, the vendor's offer is liable to be rejected.
2. Information / compliance / documents submitted by vendor shall be authentic in all aspects. In case any deviation / false information / forged documents are observed, BHEL is free to initiate appropriate punitive proceeding against the supplier.
3. BHEL reserves the right to visit vendor work's to ensure compliance of annexure-1.