


REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: AKSPROP114 RFQ DATE : 19.02.2025	Due Date/Day: 06.03.2025 THU Time : 13:00 HRS <div style="background-color: black; width: 100px; height: 20px; margin: 5px 0;"></div> <div style="background-color: black; width: 100px; height: 20px; margin: 5px 0;"></div>
MMI:PU:RF:003			
(address for communication) :		(for all correspondence) Purchase Executive : ABHISHEK Phone : 26998102 Fax : 00918026989215 E-mail: singh.abhishek@bhel.in	

SI No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	TI0668104317 3-PHASE COIL 0.18MH + /-10% 184A 415VAC * HSN/SAC : 8504 <div style="background-color: black; width: 300px; height: 15px; margin: 5px 0;"></div> <div style="background-color: black; width: 350px; height: 15px; margin: 5px 0;"></div> <div style="background-color: black; width: 50px; height: 15px; margin: 5px 0;"></div> 3-PHASE COIL 0.18MH + /-10% 184A 415VAC <div style="background-color: black; width: 250px; height: 15px; margin: 5px 0;"></div> As per Specification PS4452498 Rev No 04	750	NO	750	30.05.2025

Total Number of Items - 1

- 1.
- 2.

NOTES:

1. This RFQ is governed by:
 - a) INSTRUCTIONS TO BIDDERS/SELLERS and GENERAL CONDITIONS OF CONTRACT FOR PURCHASE available at <http://edn.bhel.com> (**RFQ-PO Terms & Conditions**)
 - b) Any other specific Terms and Conditions mentioned.


* The HSN/SAC no mentioned against the line items in the RFQ are indicative only.

For and On behalf of BHEL.

ABHISHEK
Control Equipment

1 OF 1

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1 OF 1

1. SCOPE

The Pre-Qualification Requirement document specifies the requirements to be met by the vendors (hereafter called Bidder) who wish to participate in the tender for supply of **0.18mH Sinewave Filter Inductor for rolling stock applications.**

This PQR should be read in conjunction with the Purchase Technical Specification **PS4452498 R04 dtd 18.10.2021.**

2. CREDENTIAL

- a) The Bidder should be Manufacturer or authorized dealer / supplier of - **0.18mH Sinewave Filter Inductor** used in Rolling Stock applications. Documentary proof like relevant POs / invoice copies, valid authorization certificate etc shall be provided along with the offer.
- b) The Rolling Stock Applications under consideration shall include Locomotive, EMU, MEMU, Metro Trains, High Speed Trains, Train sets, Inspection Cars and Special Track Machines.
- c) For the vendors outside India, documentary proof for usage of the product in rolling stock applications shall be submitted. Acceptance of such certification shall be at BHEL's discretion.
- d) The Bidder should not be under the category of "hold" or "blacklisted" by any of the BHEL units/ any Govt of India PSU/ Govt of India/ statutory bodies of any state Govt as on date of bid submission. A declaration to this effect shall be submitted along with the offer.

3. QUALITY SYSTEM

- a) The manufacturer should have valid ISO 9001:2015 or latest certification covering the manufacturing and testing of the subject item
- b) The manufacturer should possess a clearly laid down quality Assurance Plan for the product covering the following aspects
Organization Chart, clearly indication the quality control set up
Qualification of key personnel and officials deployed in the quality control cell.
- c) Process Flow Chart indicating process of manufacture for an individual product or for a family of products, if the process is same.
- d) Quality Assurance System – Inspection and Testing plan to cover
 - Incoming material
 - Process control
 - Product control
 - System control
 - Testing facility
- e) Stage inspection details shall include the inspection procedure, inspection parameters, method of testing/ test procedure, sample sizes for destructive & non-destructive testing etc.
- f) Calibration scheme and status of calibration of test equipment
The process, testing and measuring equipment shall be duly calibrated by approved agency and the validity of calibration should be current.

4. GENERAL REQUIREMENTS

- a) It is preferred that the bidder is the manufacturer of this item. If the bidder is importing some portion of the components, then minimum value addition in India shall be 20%. Bidder to confirm this in the offer. Value addition less than 20% is not acceptable. A declaration to this effect shall be submitted along with the offer.
- b) The technical bid of bidders, which qualify technically but are not approved for the subject item by the Customer Approving Authority, shall be referred by BHEL to the customer Approving Authority for approval with intimation to the bidder. Consequent to the decision of Customer Approving Authority, the bidder shall be added to the vendor list of the subject item for future tenders. Concurrently BHEL shall consider placing developmental order on the bidder after accessing the capability of the bidder to manufacture / develop the subject item. However, BHEL shall treat the offer as “Not meeting” Pre-Qualification Criteria for the subject tender.
- c) The Customer Approving Authority shall be RDSO/CLW/BLW/PLW/ICF/RCF/MCF or any other agency as designated by the Customer.
- d) The bidder should possess a valid type test report, not older than five years, as per relevant standards mentioned in the specification with respect to time during the bid submission in case of catalog items. In case of custom made items, a bidder can submit the type test report of an item of similar or higher rating with a declaration for conducting the type test in case of award of order or developmental order. The bidder can also submit the test reports conducted in their own facility with the document of their lab accreditation. However, BHEL reserve it's right to insist on conducting the Type test again in a laboratory of it's choice.
- e) For the bid of vendors already qualified and appearing in BHEL's source list, the requirement of type test report and proof of supply shall not be applicable.

5. DOCUMENTATION TO BE SUBMITTED ALONG WITH OFFER

- a) Documentary proof for experience as per clause 2.a
- b) Clause by Clause compliance to the technical specification
- c) Declaration regarding status as per clause 2.d
- d) Declaration on MII (Make in India) as per clause 3.a
- e) Declaration for conducting Type Test as per clause 3.d



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PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P.S NO. : PS4452498

REV. NO: 04

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SPECIFICATION FOR SINE WAVE FILTER INDUCTOR

REVISION HISTORY SHEET

REV. NO.	DATE	NATURE OF CHANGE	REASONS	PREPARED BY	APPROVED BY
00	02.04.2014	FIRST ISSUE		David J	Shekar R
01	23.07.2014	SECOND ISSUE		David J	Shekar R
02	12.12.2015	THIRD ISSUE		Venkatesh R	Shekar R
03	21.09.2018	FOURTH ISSUE	Winding Material	Purushottama	Shekar.R
04	18.10.2021	FIFTH ISSUE	PSI Clause	L Sunitha	Agosh C

REVISIONS

04

APPROVED BY

18.10.21

PREPARED BY

L. SUNITHA

ISSUED BY

TRACTION ENGG.

DATE

18.10.2021

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PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P.S NO. : **PS4452498**

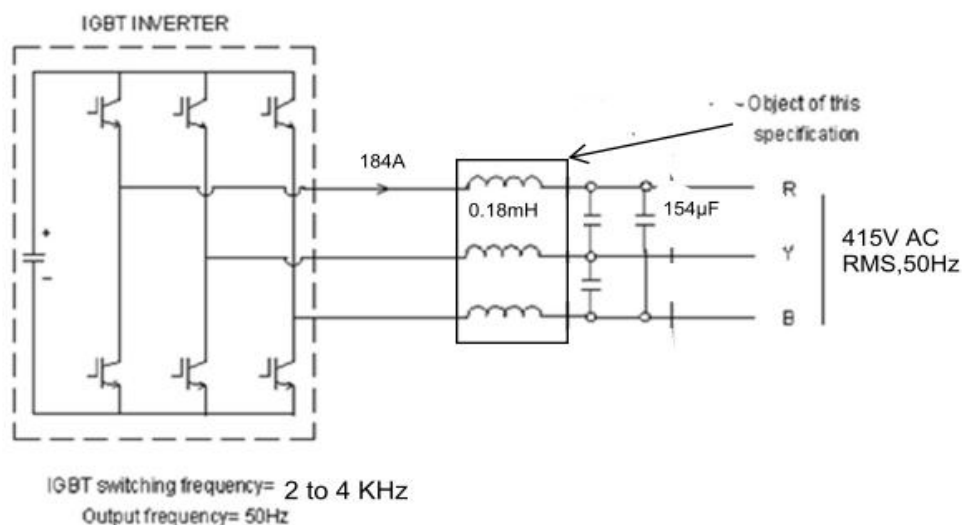
REV. NO: 04

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SPECIFICATION FOR SINEWAVE FILTER INDUCTOR

1.0 Functional requirements:

This document covers specification of a Sine wave filter Inductor, to be used at the output of an IGBT based inverter. The Inductor will be mounted in a cabinet/enclosure and will be used in traction applications for on board mounting. The block diagram is shown below.



2.0 APPLICATION : Sine filter Inductor

3.0 TYPE : Dry Type, Air natural cooling

4.0 REFERENCE STANDARDS:

IEC 60076/ IS5553	Power transformers
IEC 60077-1	Railway applications – electric equipment for rolling stock-part 1.
IEC 60085	Thermal evaluation and classification of electrical insulation
IEC 60146-1-3	Semiconductor converters ... Transformers and reactors
IEC 60310	Traction transformers and inductors
IEC 61287-1	Electronic power converters installed on rolling stock
IEC 61373	Railway applications – Rolling stock equipment –shock and vibration tests
EN50124	Railway Applications - Insulation Coordination Basic Requirements - Clearance And Creepage Distances
IEC60571/EN50155	Operating conditions

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PURCHASE SPECIFICATION **GROUP: TRACTION ENGINEERING**

P.S NO. : PS4452498

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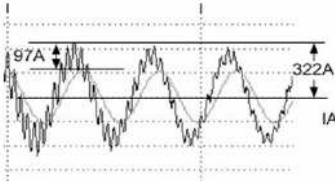
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SPECIFICATION FOR SINEWAVE FILTER INDUCTOR

5.0 ENVIRONMENTAL CONDITIONS:

- 5.1 Ambient Temperature : 55°C
- 5.2 Maximum Temperature : 70°C (when locomotive standing dead under sun)
55°C (when locomotive working)
47°C Nominal
- 5.3 Relative Humidity : IEC60571
up to 95% any moisture condensation during operation shall not lead any damage Or failure
Yearly average $\leq 75\%$ Rel. Humidity
- 5.4 Altitude : up to 1200 m above mean sea level
- 5.5 Atmosphere during hot weather: Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach a high value of 1.6mg/cub meter.
- 5.5 Air Pollution : The equipment shall be designed to work in coastal area in humidity and salt laden Corrosive atmosphere. The maximum values will be as follows
(a) Maximum pH Value : 8.5
(b) Sulphate : 7mg/liter
(c) Maximum concentrate of chlorine: 6mg/liter
(d) Maximum conductivity: 130 μ Siemens
- 5.6 Climate : Tropical, Hot and humid Climate

6.0 ELECTRICAL REQUIREMENTS

Issue	Unit	Min	Nom	Max	Notes
Output power	kVA		132.5	265	265kVA during 5 sec At nominal output voltage
Output voltage	V	0	415	436	Maximum voltage = 415 + 5%
L	μ H		180		Total 3 x 180
Inom	Arms		184	194	286Arms during 5 sec
Ripple	%	50			Peak peak
I_Linearity (10%)	Apeak	322			up this current the inductance must be in a tolerance +/- 10% 50% of 194 = 97A _{app} \Rightarrow 48.5A _{peak}
					194A _{ac} gives 194.SQRTT(2) = 274A _{peak} Max peak current: 274+48.5 = 322A
asymmetry	%			10	
Frequency	Hz	25	50	53	continuously
Fs	kHz		2	4	Switching frequency of the inverter
Udc	Vdc		700		DC-link voltage.

Noise Level Max: 75db

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P.S NO. : PS4452498

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SPECIFICATION FOR SINEWAVE FILTER INDUCTOR

7.0 CONSTRUCTION

7.1 Core:

7.1.1 Electrical steel should be CRGO with grade of M4 or better along with test certificate.

7.1.2 The inductor is open type, the inductor shall be compact.

7.2 **Winding:** Windings to be of electrolytic Grade copper LITZ wire

7.3 Cooling Type:

7.2.1. Supplier shall indicate if additional cooling is required and the required airflow.

7.2.2 Suitable temperature sensor shall be incorporated for the winding where maximum HOTSPOT is Anticipated and the method of temperature measurement shall be indicated in the offer.

7.4 **Insulation:** Class H All windings to be uniformly insulated. Neutral point of secondary windings to be Insulated to full line voltage. Should meet the requirement as per IS2026 /IEC 60076
Insulation Voltage 2500 Vrms – Test voltage 50Hz/1min
Pollution degree: PD3A as of EN50124

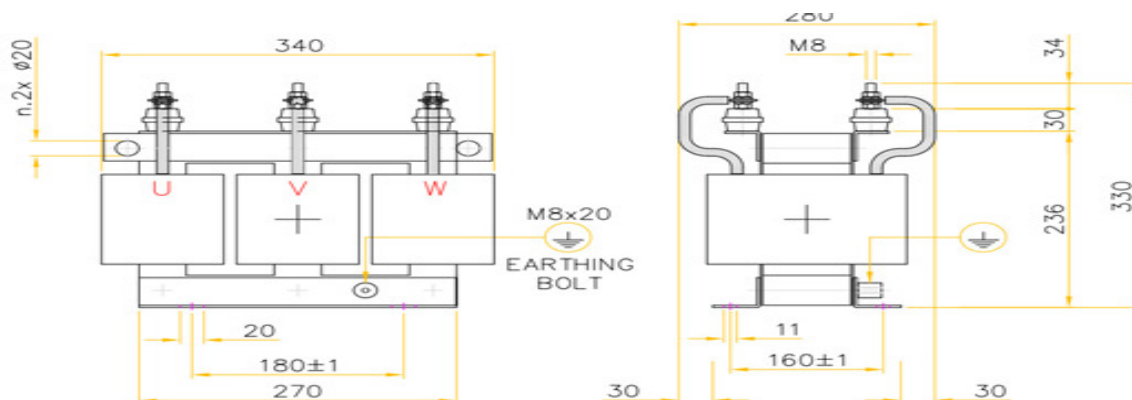
7.5 Impregnation:

Inductor assembly impregnated under vacuum with epoxy based resin for achieving high hygroscopic acid & Alkali resistant insulation. The complete winding should have smooth finish after impregnation to ensure high Mechanical strength. Thickness of the resin should be uniform. The insulation should be self-extinguish type.

7.5 Terminals ,markings, and connections: As per IS : 2026 and existing inductor

9.0 MECHANICAL DIMENSION LIMITATION

The inductor dimensions (overall & mounting) shall not exceed the dimensions indicated in the below sketch. This sketch is given for guidance only for limiting dimensions



Supplier to prepare detailed drawing & submits to BHEL for approval before commencing manufacturing process

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SPECIFICATION FOR SINEWAVE FILTER INDUCTOR

10.0 TESTS TO BE CONDUCTED AT SUPPLIER'S WORKSPACE

Three Phase inductor	IEC60310 Clause		
	Type	Routine	Investigative
Preliminary checks	–	10.3.3	
Measurement of winding resistance	–	10.3.4	
Measurement of losses	10.3.5	–	
Measurement of inductance	10.3.6	10.3.6	
Temperature-rise	10.3.7	–	
voltage between terminals withstand	10.3.8.1	10.3.8.1	
separate source voltage withstand		10.3.8.2	
full wave impulse voltage withstand	10.3.8.3		
Shock and vibration withstand	10.3.9		

Tolerance – According to IEC-60289

11.0 TEST PROTOCOL

Supplier shall submit test protocol for Routine & Type tests along with techno-commercial offer. List of tests are as per clause 5.0 of this specification.

12.0 DOCUMENTATION

12.1 Information required along with techno commercial offer without which offer is liable for rejection.

12.2 Supplier shall furnish clause wise confirmation/comments to the technical specification in the Typical format given below. Deviation, if any, shall be clearly brought out indicating the clause Number, original specification, deviation sought with proper technical backup (catalogue, Technical brochure, international standards, calculations etc.

If no deviations required, then supplier shall furnish certificate indicating “NO DEVIATION REQUESTED” and we comply fully with all the technical requirements of this specification no.

PS4452498

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SPECIFICATION FOR SINEWAVE FILTER INDUCTOR

- 12.3 Supplier shall take a copy of this specification and sign on each page and submit the signed copy along with offer.
- 12.4 Supplier shall furnish winding material, winding resistance, winding cross section.
- 12.5 Supplier shall furnish the type of core used along with technical details of core.
- 12.6 Information required after the placement of order
- 12.7 Detailed dimensional drawing for BHEL approval
- 12.8 Test protocol for BHEL approval.
- 12.9 Information required along with material supply.
- 12.10 Two sets of Test certificates.
- 12.11 BHEL engineer witnessed Pre inspection report.

13.0 ACCEPTANCE

- 13.1 Dimensions as per approved drawing
- 13.2 Routine test certificate

14.0 TYPE TEST

BHEL reserves the right to demand for type test reports/ type testing on the component on sample basis, whenever required, for quality performance testing.

15.0 RATING PLATE DETAILS

Weather proof Rating Plate (with following information) shall be fixed at a suitable position.

- 15.1 BHEL Specification No.
- 15.2 Rated Inductance
- 15.3 Rated Voltage
- 15.4 Rated Current
- 15.5 Serial number
- 15.6 Month & Year of Manufacture
- 15.7 Total mass
- 15.8 Ambient Temperature
- 15.9 Type of Reactor
- 15.10 IP class
- 15.11 Manufacturer' Name
- 15.12 Insulation level/Insulation Class
- 15.13 Number of Phases
- 15.14 Rated Frequency
- 15.15 Type of Cooling
- 15.16 Thermal class of Insulation

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