

# REQUEST FOR QUOTATION



**BHARAT HEAVY ELECTRICALS LIMITED**  
 Electronics Division  
 PB No. 2606, Mysore Road Bangalore - 560026  
 INDIA

RFQ NUMBER:  
**AKSPROP153**

Due Date/Day: 16.03.2026 MON  
 Time : 13:00 HRS

RFQ DATE :  
 02.03.2026

MMI:PU:RF:003

(address for communication) :

(for all correspondence)

Purchase Executive : ABHISHEK  
 Phone : 26998102  
 Fax : 00918026989215  
 E-mail: singh.abhishek@bhel.in

This RFQ is for entering into Rate contract (RC) with BHEL for the tendered item. Validity of the RC will be 1 year from the award of rate contract. Firm orders will be placed during the tenure of rate contract. Prices will remain firm till the validity of RC or till the completion of supplies against the Purchase Orders placed against this rate contract whichever is later. Please note that these quantities are projections based on the current business scenario and expected orders from customers. In the eventuality of business not coming through, BHEL is not obligated to exhaust the ordering of RC quantities.

Sl No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	TI0668103574 3 PH TRANSFORMER 415/140Vac 21,6/61,7Amp * HSN/SAC : 3921 [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] 3 PHASE TRANSFORMER 415/140Vac 21,6/61,7Amp [REDACTED] As per PSPEC PS4452499 Rev No 03	160	NO	160	20.06.2026

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. 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 **15KVA Battery Charger Transformer for rolling stock applications.**

This PQR should be read in conjunction with the Purchase Technical Specification **PS4452499 R03 dtd 18.10.2021.**

## **2. CREDENTIAL**

- a) The Bidder should be Manufacturer or authorized dealer / supplier of - **15KVA Battery Charger Transformer** 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. : PS4452499

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SPECIFICATION FOR TRANSFORMER

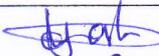
REVISION HISTORY SHEET

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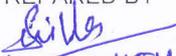
REV. NO.	DATE	NATURE OF CHANGE	REASONS	PREPARED BY	APPROVED BY
00	02.04.2014	FIRST ISSUE		David J	Shekar R
01	23.07.2014	SECOND ISSUE		David J	Shekar R
02	09.12.2015	THIRD ISSUE		Purushottama Rao	Shekar R
03	18.10.2021	FOURTH ISSUE		L Sunitha	Agosh C

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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. : PS4452499

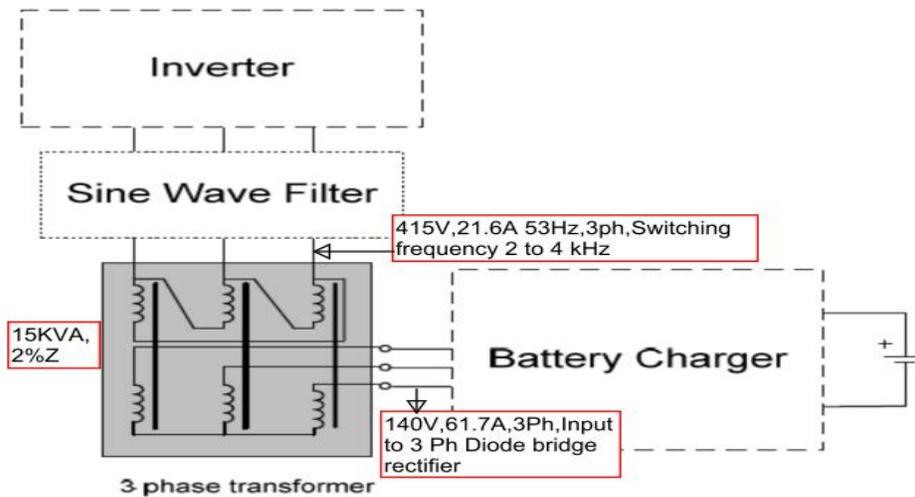
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### SPECIFICATION FOR TRANSFORMER

#### 1.0 FUNCTIONAL REQUIRMENTS:

This document covers specification of a Battery Charger Transformer, to be used at the output of an IGBT based inverter. The Transformer 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 DUTY:** Rectifier Duty - 3 Phase Full Wave Diode Rectifier Bridge

**3.0 TYPE:** Dry Type, Air natural cooling

#### 4.0 REFERENCE STANDARDS:

IEC 60076/ IS2026/IS11171	Power transformers
IEC 60077-1	Railway applications – electric equipment for rolling stock-part 1.
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
EN61558/ IEC 61558-2-16	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V
EN50124-1,IEC1376	Railway Applications - Insulation Coordination Basic Requirements - Clearance And Creepage Distances
IEC60571/EN50155	Operating conditions

The equipment shall comply with the latest issues of applicable IEC and other standards, Including at least the Following

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**SPECIFICATION FOR TRANSFORMER**

**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 12.4
- 5.3 Relative Humidity : IEC60571  
up to 95% any moisture condensation during operation shall not lead any  
Damage or failure  
Yearly average ≤ 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:130µSiemens/CM
- 5.6 Climate : Tropical, Hot and humid Climate

**6.0 ELECTRICAL REQUIREMENTS**

- 6.1 Primary Voltage: 415 V, 3 ph, Constant Flux
- 6.2 Secondary Voltage: 140 V, 3 ph
- 6.3 Primary Current: 21.6A
- 6.4 Secondary current: 61.7A
- 6.5 Efficiency: > 95%
- 6.6 Impedance: < 2% (Short circuit voltage)
- 6.7 Frequency: Min 0 Hz, Nom 50 Hz, Max 53 Hz at Constant Flux
- 6.8 Noise Level Max: 75 dB
- 6.9 Switching Frequency: 2 to 4 KHz
- 6.10 Output power: 15KVA
- 6.11 Short Time Duty : 30 KVA for 5 sec at nominal output voltage
- 6.12 Vector group: Dyn5
- 6.13 Input Wave form THD: 10 %
- 6.14 Combined voltage and frequency variation: 10% (Absolute sum)
- 6.15 Voltage/ Freq ratio operation shall be designed for continuous operation at no load and 110  
Percent of rated V/F.

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**SPECIFICATION FOR TRANSFORMER**

6.16 Short circuit: withstand ability should have the ability to withstand over currents during external Short circuits. In line with IS/IEC standards.

6.17 Loss: Maximum loss values to be indicated in the data sheet for no load and full load

**7.0 CONSTRUCTION**

7.1 Core: Electrical steel should be CRGO silicon steel laminations with grade of M4 or better along with test certificate.

7.2 Winding: Windings to be of electrolytic Grade copper conductor

7.3 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

7.4 Cooling

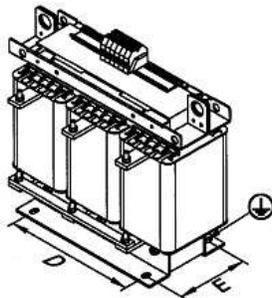
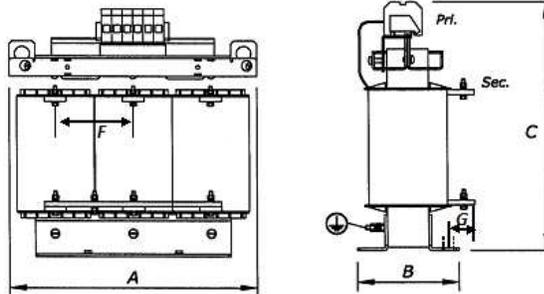
7.4.1 Air Natural at an ambient of 70 °C during summer

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

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

**8.0 MECHANICAL DIMENSION LIMITATION**

The Transformer 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.



**Dimensions in mm**

A= 450; B=235; C=440; D=316; E=173

F=140; G=22

Mounting hole =  $\Phi$ 12x18

Output connecting bolt size on bus bar - M6

PE terminal bolt size – M8

*Provision for PE connection to be provided on the bottom left side when facing the primary connection side*

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**SPECIFICATION FOR TRANSFORMER**

**9.0 Reliability and safety**

- 9.1 Life time: 30 yrs
- 9.2 Maintenance : Maintenance free
- 9.3 Operating hours : 8640 Per year
- 9.4 Power stress level : 100 %
- 9.5 FIT : 100 Failures / 10<sup>9</sup> Operating hours
- 9.6 Safety : Fire / Smoke and insulation safety as per standards

**10.0 TESTS TO BE CONDUCTED AT SUPPLIER'S WORKSPACE**

Three Phase Transformer	IEC60310 Clause		
	Type	Routine	Investigative
Preliminary checks	-	-	
Measurement of winding resistance	10.2.4	10.2.4	
Measurement of voltage ratios	10.2.5	10.2.5	
Measurement of no-load primary current and losses	10.2.6.1	10.2.6.2	
Measurement of impedance voltage	10.2.7	10.2.7	
Measurement of load losses	10.2.8.2	10.2.8.3	
Determination of total losses	10.2.9		
Temperature-rise	10.2.10		
induced voltage withstand		10.2.11.1	
separate source voltage withstand		10.2.11.2	
Behavior under short-circuit conditions (optional)	-	-	10.2.12
Shock and vibration withstand	10.2.13	-	

**10.1 Tolerance- As specified IEC60310 Standard**

**10.2 TEST PROTOCOL**

Supplier shall submit test protocol for Routine & Type tests along with techno-commercial offer. List of tests are as per clause 10.0 of this specification.

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**SPECIFICATION FOR TRANSFORMER**

**11 DOCUMENTATION**

- 11.1 Information required along with techno commercial offer without which offer is liable for rejection.
- 11.2 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. PS4452499
- 11.3 Supplier shall take a copy of this specification and sign on each page and submit the signed copy along with offer.
- 11.4 Supplier shall furnish winding material, winding resistance, winding cross section.
- 11.5 Supplier shall furnish the type of core used along with technical details of core.
- 11.6 Information required after the placement of order
- 11.7 Detailed dimensional drawing for BHEL approval
- 11.8 Test protocol for BHEL approval.
- 11.9 Information required along with material supply.
- 11.10 Two sets of Test certificates.
- 11.11 BHEL engineer witnessed Pre inspection report.

**12 ACCEPTANCE**

- 12.1 Dimensions as per approved drawing
- 12.2 Routine test certificate

**13.0 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.

**14.0 RATING PLATE DETAILS**

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

- 14.1 BHEL Specification No;
- 14.2 KVA Rating; Voltage Ratio;
- 14.3 HV / LV Current;
- 14.4 No of Phases; Vector Grouping;
- 14.5 System Frequency;
- 14.6 Insulation Level/ insulation Class;
- 14.7 % Impedance;
- 14.8 No load Current: Amperes (optional);
- 14.9 Iron Loss / copper loss: Watts (optional);
- 14.10 Ambient Temperature; Temperature class of windings;
- 14.11 Weight;
- 14.12 Serial No;
- 14.13 Date of manufacture;
- 14.14 Manufacturer Name;
- 14.15 Cooling Medium Type; Identification of cooling method
- 14.16 Connection Diagram

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