REQUEST FOR QUOTATION

MMI:PU:RF:003

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

RFQ NUMBER: AKSPROP063

RFQ DATE : 14.10.2023

Due Date/Day: 02.11.2023 THU
Time : 13:00 HRS
[redacted]

(address for communication) :

(for all correspondence)
Purchase Executive : ABHISHEK
Phone : 26998102
Fax : 00918026989215
E-mail: singh.abhishek@bhel.in

1)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.

2)Reverse Auction Clause: BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) for this tender. RA shall be conducted among all the techno-commercially qualified bidders. Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered as initial bids of bidders in RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking.

Sl No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	TI0668103574 3 PH TRANSFORMER 415/140Vac 21,6/61,7Amp * HSN/SAC : 3921 [redacted] 3 PHASE TRANSFORMER 415/140Vac 21,6/61,7Amp [redacted] As per Specification PS4452499 Rev No.03	250	NO	250	[redacted]

Total Number of Items - 1

1.
2.

[redacted]

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

For and On behalf of BHEL.

ABHISHEK
Control Equipment

PREQUALIFICATION CRITERIA (PQC) FOR BATTERY CHARGER TRANSFORMER GROUP: TRACTION ENGINEERING	**Ref:** 445/PQ_BT/21	
	Rev. No.: 01	
	Page 1 of 1	

1.0 PRE QUALIFICATION CRITERIA (PQC)

1. The Bidder should be Supplier of Power transformers used in Traction applications.
2. BHEL shall approach and submit credentials/details furnished by vendor with their offers to customer and await customer's decision for a maximum of one month from the date of tender opening. If approval is not received within the above period, BHEL shall treat the offer as "Not meeting" Pre-qualification criteria and offer shall be rejected.
3. 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 shall be 20%. Bidder to confirm this in the offer. Value addition less than 20% is not acceptable

2.0 DOCUMENTS SUBMISSION

1. Bidder to submit clause by clause compliance to complete technical specification (Technical specification no. PS4452499 Rev. No.03, dated 18-10-2021) along with copy of type test report.
2. Should possess a valid type test report, not older than five years, conducted at a NABL accredited laboratory as per relevant standards mentioned in the specification with respect to time during the bid submission.
3. Proof of supply of Power transformers used in traction applications directly or through any agency to Indian Railways during the last 5 years to be submitted.

3.0 REFERENCE DOCUMENTS

a) Purchase Specification No PS4452499, Rev. No. 03 for Battery charger transformer.

REVISION 01	APPROVED AGOSH CHANDRAN R S		
	PREPARED L SUNITHA	ISSUED TRACTION ENGG	DATE 07.06.2022

A4 – 12	PURCHASE SPECIFICATION GROUP: TRACTION ENGINEERING	P.S NO. : PS4452499 REV. NO: 03 PAGE 00 OF 05

SPECIFICATION FOR TRANSFORMER

REVISION HISTORY SHEET

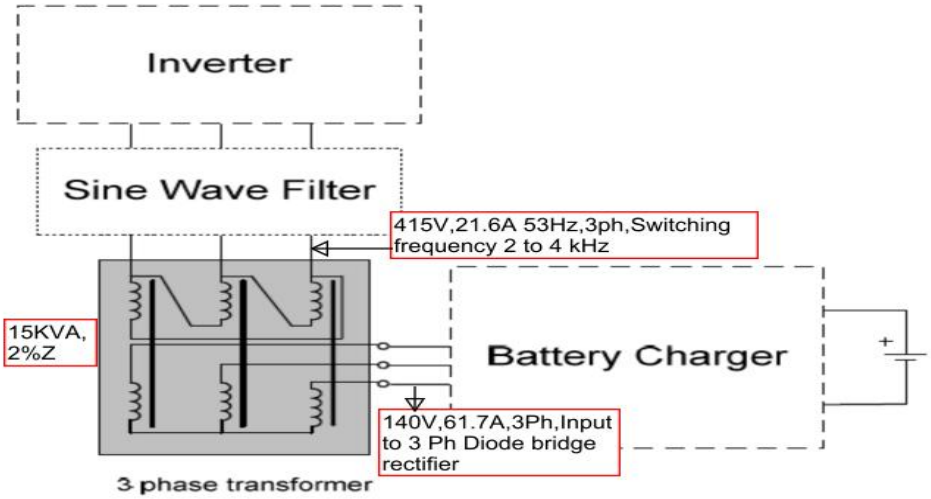
REV. NO.	DATE	NATURE OF CHANGE	REASONS	PREPARED BY	APPROVED BY
00	02.04.2014	FIRST ISSUE		David J	Shekar R
01	23.07.2014	SECOND ISSUE		David J	Shekar R
02	09.12.2015	THIRD ISSUE		Purushottama Rao	Shekar R
03	18.10.2021	FOURTH ISSUE		L Sunitha	Agosh C

REVISIONS 03	APPROVED BY 18.10.21		
	PREPARED BY L. SUNITHA	ISSUED BY TRACTION ENGG.	DATE 18.10.2021

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 REFERANCE 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

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°CNominal 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.

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

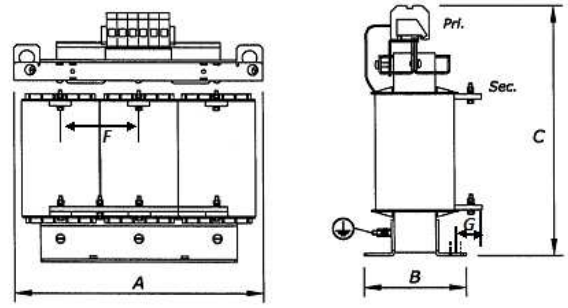
7.4.1 Air Natural at an ambient of 70 ˚C during summer

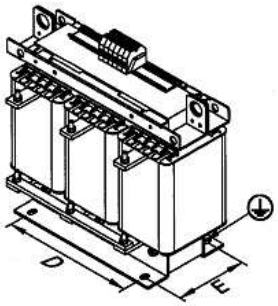
7.4.2 Supplier shall indicate if additional cooling is required and the required airflow.

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 = Φ12x18
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

REVISIONS	03	APPROVED BY		
		PREPARED BY	ISSUED BY TRACTION ENGG.	DATE 18.10.2021

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 / 10^9 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.

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