REQUEST FOR QUOTATION

MMI:PU:RF:003

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

RFQ NUMBER: AKSPROP016

RFQ DATE : 19.07.2022

Due Date/Day: 01.08.2022 MON
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	TI0668107995 EARTHING CAPACITOR, 0.5 UF, 4000V DC * HSN/SAC : 9032 [redacted] EARTHING CAPACITOR VALUE : 0.5 MICRO FARAD + /-10%, Undc :4000V DC, Irms:80A As per Specification PS4452715,Rev. 00	1,000	NO	1,000	[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

1.0 PRE QUALIFICATION CRITERIA (PQC)

1. The Bidder should be Supplier of Capacitors 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. PS4452715 Rev. No.00, dated 28-01-2021) 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 0.5µF Earthing Capacitors 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 PS4452715, Rev. No. 00 for 0.5µF Earthing Capacitors.

PURCHASE SPECIFICATION FOR 0.5µF EARTHING CAPACITOR

REVISION HISTORY SHEET

REV. NO	DATE	NATURE OF CHANGE	REASONS	PREPARED BY	APPROVED BY
00	28.01.2021	FIRST ISSUE	--	Jamuna Rani S	Agosh Chandran

THIS DOCUMENT IS A SPECIFICATION CUM DATA SHEET. VENDOR TO GIVE CONFIRMATIONS AND DATA AS REQUIRED AND SUBMIT THE SAME TO BHEL / EDN, BANGALORE. ANY DEVIATIONS TO THIS DOCUMENT TO BE BROUGHT OUT CLEARLY BY VENDOR.

REVISIONS 00 DT: 28.01.2021

APPROVED BY: Agosh Chandran R S

PREPARED BY:	ISSUED BY	DATE
Jamuna Rani S	TRACTION ENGG	28.04.2021

SPECIFICATION FOR 0.5µF EARTHING CAPACITOR

Brief description

The capacitor in this specification is the earthing capacitor used in IGBT propulsion systems.

1. Detailed Specification

1. Electrical Parameters

1.	**Capacitance**	**:**	**0.5 µF +/10%**
2.	**Rated Voltage**	**:**	**4000V DC**
3.	**Max. RMS Current**	**:**	**80A Rms**
4.	**Test Voltage b/w terminals AC test voltage (rms value)**	**:**	**AC 5000V/50Hz/10s**
5.	**Test Voltage b/w terminals**	**:**	**DC 6000V/10sec**
6.	**Series resistance**	**:**	**1.1 mΩ**
7.	**Tangent of Loss Angle**	**:**	**$2*10^{-4}$**
8.	**Self Inductance**	**:**	**<20nH**
9.	**Maximum Peak Current**	**:**	**3000 A**
10.	**Maximum Surge Current**	**:**	**7500A**
11.	**Cooling**	**:**	**Natural Convection**

2. Mechanical Requirements (Refer Fig. 1)

1.	**Dimensions (mm)**	**:**	**83 x 79**
2.	**Weight**	**:**	**0.7Kg**

3. Clearance distance b/w terminals : >=60 mm

4. Clearance distance b/w terminals and case : >=40 mm

5. Colour : GREY RAL 7031

6. Shock Resistance : As per IEC 61373

7. Vibration : As per IEC 61373

2. Standards

Standard	Description
IEC61881-1	Rolling stock equipment – capacitors for power electronics
IEC61373	Shock and vibration test
EN50125-1	Environmental conditions
IEC61376	Creepage and clearance

3. Functional requirements

Description	**Value**	**Unit**
Operating hours	8640	hours/year
Typical load	continuous operation	
Surge current	1	times/year

4. Ambient conditions / operating conditions

Description	Value	Unit	Notes
Operating Temperature	-25..+85	°C	
Temperature distribution over the year	+75	°C	10 days/year
	+65	°C	20 days/year
	+55	°C	90 days/year
	+40	°C	100 days/year
	< +40	°C	130 days/year
Storage	-25..+70	°C	
Average year temperature	+ 40	°C	
Relative humidity	< 95	%	During app 3 - 4 months (rainy season) per year frequent condensation can occur
Altitude	<1200	m	
Pollution levels			
Operation in coastal areas			
Maximum PH	8.5		of water damp
Max. concentration of sulphate	7	mg/liter	of water damp
Max. concentration of chlorine	6	mg/liter	of water damp
Maximum conductivity	130	µS/cm	of water damp
Operation in desert terrain			
Dust content in air	1.6	mg/m3	

5. Reliability, availability, maintainability and safety

Description	Value	Unit	Notes
Design life	30	years	Expected lifetime: 30 x 8640 = 260000 hours
Failure rate	50	FIT	
Maintenance			To be defined by supplier
Safety			The risk of explosion due to over voltage, ageing, loss or other reasons should be minimized

6. Dimensional details

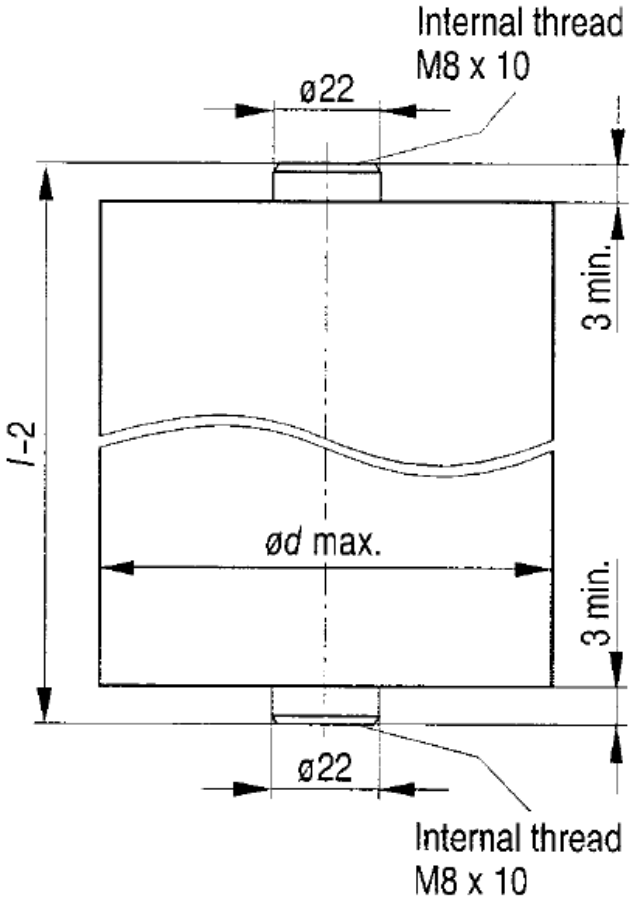

Fig 2: Dimensional Drawing

7. Testing

List of tests to be performed on prototype as per IEC 61881 are as follows

Sl No	Test	Acceptance criteria	Type/Routine Test
1	Capacitance and Tanδ measurement	Measurements should be within the tolerances specified by the manufacturer	Type/Routine
2	Dimensional check	Dimensions to comply with the Approved drawing	Type/Routine
3	Voltage test between terminals and case	During the test neither flashover nor puncture should occur.	Type/Routine
4	Voltage test between terminals	During the test neither flashover nor puncture should occur. Capacitance measured after the test should be within the range specified	Type/Routine
5	Surge discharge test	After conducting the test capacitance to be measured and the change should be < +/-1%	Type
6	Thermal stability test and loss angle tangent measurement test	No breakdown of the capacitor should occur during the test. The capacitor losses should be measured after the test and should be within the tolerances specified by the manufacturer	Type
7	Self-healing test	Change of capacitance after the test should be < +/- 0.5%	Type
8	Resonance frequency measurement	The self-inductance measured should be within the tolerances specified by the manufacturer	Type
9	Environmental Test 1. Damp heat test 2. Change of temperature	Change of capacitance after the test should be < +/-2%	Type
10	Mechanical tests Mechanical tests of terminals 1. External inspection 2. Vibration and shocks	No mechanical damage should occur after the test.	Type
11	Endurance test	Change of capacitance after the test should be < +/-3%	Type

8. Rating plate

The following information shall be given on the rating plate of each capacitor unit:

1. Manufacturer
2. Identification number and manufacturing date
3. C = µF
4. Tol = %
5. UNDC or UN = V
6. θ min = °C
7. θ max = °C
8. Maximum tightening torque = Nm

9. Documentation

1. Datasheet
2. Dimensional Drawing
3. Type test Procedure, Type test Report
4. Routine test Procedure, Routine test Report

10. Acceptance

1. Routine test report to be submitted along with each delivery
2. Equipment shall be packed in a manner suitable for delivery and storage at the appointed delivery address. Transport packaging will provide adequate protection against accidental damage during normal handling. Terminals, leads, mounting brackets will be protected from mechanical damage

Notes:

1. Mounting dimensions needs to be strictly adhered as per the approved drawing submitted by the vendor
2. Supplier should try to minimize the self-inductance and series resistance to a lower value as much as possible