

REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: MTB0002411 RFQ DATE : 11.04.2017	Due Date/Day: 28.04.2017 FRI Time : 13:00 HRS Tender Box : Reception Area Opening Venue: NEW ENGG. BLDG
MMI:PU:RF:003			
(address for communication) :		(for all correspondence) Purchase Executive : MALATHI T Phone : 26998929 Fax : 00918026989227 E-mail: malathit@bheledn.co.in	

Sl No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	TI0668108000 Sinewave Filter Inductor, 3Ph, 1.3mH Doc No.- PS4452560 Rev - 00 Inductance: 1.3mH, 3Phase; Maximum current: 385Arms; Nominal voltage: 750V; Maximum switching voltage: 1800V; Frequency (nominal): 50Hz; Switching frequency: 1kHz; As per spec PS4452560	64	NO	16 24 24	10.06.2017 10.07.2017 10.08.2017
2	TI0668108019 Line Inductor, 1Ph, 1.5mH Doc No.- PS4452555 Rev - 00 Inductance: 1.5mH; Maximum Current: 650A rms; Nominal voltage: 960V; Maximum switching Voltage: 1800V; Nominal Frequency: 50Hz; Switching Frequency: 1200Hz; As per spec PS4452555	64	NO	16 24 24	10.06.2017 10.07.2017 10.08.2017

Total Number of Items - 2

- 1.
- 2.

TWO PART BID - SUBMIT TECHNICAL AND PRICE BID IN SEPARATE SEALED COVERS

NOTES :

- 1.This RFQ is Governed by :
 - a)INSTRUCTIONS TO BIDDERS/SELLERS(Doc No :BHEL:EDN:ITB-SHOP) available at **www.bheledn.com (RFQ-PO Terms & Conditions)**
 - b)GENERAL CONDITIONS OF CONTRACT FOR PURCHASE(Doc no :BHEL:EDN:GCC-SHOP) available at **www.bheledn.com (RFQ-PO Terms & Conditions)**
 - c)Any other specific Terms and Conditions mentioned.
2. Bidders / Representatives who would like to be present during opening of offers are required to furnish authorization letter for the same.

For and On behalf of BHEL.

MALATHI T
Control Equipment

1 OF 1

ADDITIONAL TERMS AND CONDITIONS

RFQ NO. MTB0002411

1. Separate offer in English language addressed to the Purchase Executive shall be made for this RFQ in three parts.

Three Part Bid : Offer shall be made in three parts as detailed below:

“Pre-Qualification Bid (Part I Bid)” : Documents related to PQC to be placed In a sealed cover super scribed with RFQ No., Due Date and “Pre-Qualification Bid (Part I Bid)” ,

“Techno-commercial Bid (Part II Bid)” : Techno-commercial bid to be placed in a separate sealed envelope super scribed with RFQ No, Due date & “Techno commercial Bid (Part II Bid)”. This bid should contain all commercial terms i.e. delivery terms, payment terms, applicable taxes / duties etc.

“Price Bid (Part III Bid)” : Price of the offered item to be placed in a separate sealed envelope super scribed with RFQ No, Due date and “Price Bid (Part III Bid)”.

All the three sealed envelopes shall be placed in another sealed envelope super scribed with RFQ No & Due date.

First pre qualification bid will be opened on due date . Techno commercial bid (part II) will be opened of those vendors who are qualified . in the pre qualification bid.

2. Pre qualification criteria is attached herewith.
3. There are two line items in this tender. Evaluation is based on individual line item & not as a package.
4. Type test to be conducted on one no. of each type of inductors in addition to the tendered qty. Type tested unit should be supplied to BHEL with unique identification mark / band. (cost of this type tested unit to be indicated separately along with type test charges).

5. List of type tests are as per our Specification page no. 4 of 7 clause no. 4.
 6. Type test charges in rupees / in foreign currency (for import quote) to be indicated separately in the price bid and BHEL will consider all type test charges for arriving lowest price. (the same to be confirmed in techno-commercial bid without price).
-

**PREQUALIFICATION CRITERIA (PQC)**

PQ/445/IND01

REV. NO: 00

GROUP: TRACTION ENGINEERING

PAGE 1 OF 1

**PQC FOR THREE PHASE SINE FILTER INDUCTOR &
SINGLE PHASE LINE INDUCTOR**

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BIHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

1.0 PRE QUALIFICATION CRITERIA (PQC) :

- 1.1 The Bidder shall be an Original Equipment Manufacturer (OEM) and shall have capabilities with respect to manufacturing and routine testing facilities for the similar¹ or higher (inductance & current) rating Inductors.
- 1.2 The Bidder shall give an undertaking, along with the offer, confirming that (i) they are capable of designing the Inductors suitable for Traction application and shall meet the type test requirement (for the tests listed in Sec.4 of the purchase specifications PS/445/2555 & 2560) as per IEC 60310 and IEC 61373 and (ii) in the event of an order, they will complete the type testing of first Inductor (of both the types) within three weeks from the date of BHEL Purchase Order.
- 1.3 The Bidder should furnish OGA (Auto CAD) and 3D model in both STEP & IGES format along with offer for verifying the inductor dimensions.
- 1.4 The average annual financial turnover of the bidder in the preceding three (3) financial years as on March 31st 2017 shall be at least INR 100 Lakhs.

2.0 DOCUMENTS SUBMISSION :

- 2.1. The Bidder shall indicate the list of equipment's available at their works for manufacture and routine testing of said inductors in compliance of Sl. No. 1.1 above. If necessary BHEL may visit the works.
- 2.2 Letter of undertaking for capability in compliance of Sl. No. 1.2 above.
- 2.3 OGA (Auto CAD) and 3D model in both STEP & IGES format along with offer in compliance of Sl. No. 1.3 above.
- 2.4 Self certified document in respect of financial turnover in compliance of Sl. No. 1.4 above. If necessary BHEL may verify the credentials.

Bidder should submit all the above necessary documentary evidence failing which the offers are liable for rejection.

3.0 REFERENCE DOCUMENTS :

The following Inductor Purchase Specification documents are to be completely read, understood and should be acceptable to the bidder.

- a) Annexure-I: Technical specification for 1.3mH Three Phase sine filter inductor as per Purchase Specification No.:PS/445/2560.
- b) Annexure-II: Technical specification for 1.5mH Single Phase line inductor as per Purchase Specification No.:PS/445/2555.

¹ Similar rating mean, Inductance (L) shall be 1.0 milli Henry or higher and current (I) shall be 650A or higher.

REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

DAYANANDA KUMAR .P

ISSUED BY

TRACTION ENGG.

DATE

11.04.2017



PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2555

REV. NO: 00

Page 1 of 7

Specification for 1.5mH Single Phase Line Inductor

Code No.:

REVISION HISTORY SHEET

REV. NO.	DATE	NATURE OF ISSUE	REASONS	PREPARED BY	APPROVED BY
00	17.10.2016	First issue		Girish Chand	Venkateshalu K

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS	00	APPROVED BY	<i>Venkateshalu K</i>	
		VENKATESHALU K		
		PREPARED BY	ISSUED BY	DATE
		GIRISH CHAND	TRACTION ENGG.	17.10.2016

Specification for 1.5mH Single Phase Line Inductor

1 General Instructions

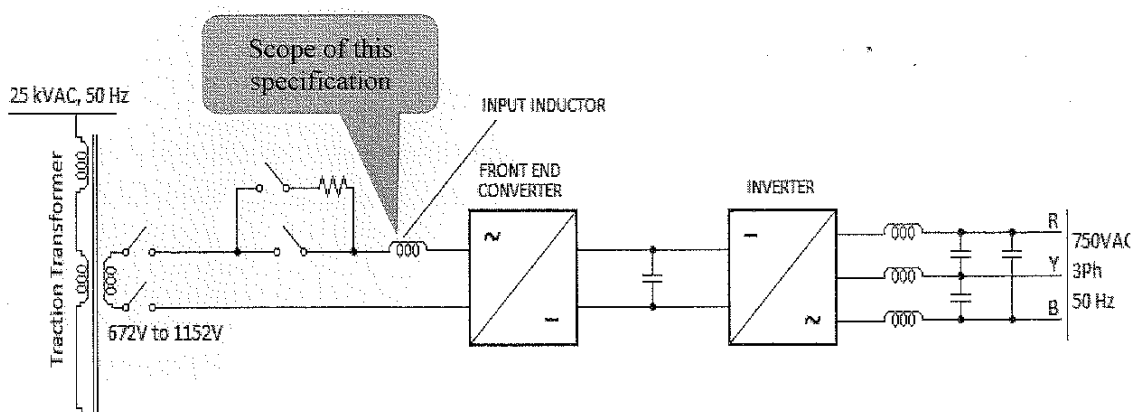
Price bid: Basic price of single phase line inductor and Type test charges to be separately indicated in this bid

- For arriving at the lowest bid price, the basic inductor price and cost of type test charges will be added.
- Type test is applicable only for the first unit. Type test charges will be paid after successful completion of the tests and acceptance of test reports by BHEL.
- Type tested unit to be supplied to BHEL with unique identification mark/band, in addition to the order quantity.

Acceptance of the inductor will be only based on the successful completion and acceptance of Type test certificates by BHEL

2 Functional Requirements

This document covers specification of an Line filter inductor, to be used at the input of converter. The inductor will be mounted in a cabinet/enclosure and will be used in **traction applications for on board mounting**. The block diagram is attached below.



REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

GIRISH CHAND

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016



PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2555

REV. NO: 00

Page 3 of 7

Specification for 1.5mH Single Phase Line Inductor

3 Technical Information

3.1 Inductance

- 3.1.1 Nominal inductance : 1.5 mH, Single phase
3.1.2 Tolerance limit : +/- 5%

3.2 Current

- 3.2.1 Rated current (RMS) : 650A
3.2.2 Peak to peak current : $\pm 990A$ (max)

3.3 Switching Voltage across Inductor

- 3.3.1 Maximum voltage : 1800V

3.4 Frequency

- 3.4.1 Nominal Frequency : 50 Hz
3.4.2 Switching frequency : 1 kHz

3.5 Core

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

3.6 Construction

: The inductor is open type. The inductor shall be compact. Winding shall be Foil.

3.7 Cooling Type

: Natural Cooling (Supplier shall also submit air flow required).

3.8 Temperature Class

- 3.8.1 Thermal class of winding : H
3.8.2 Temperature rise : H (Duty class 2) as per IEC 60310
3.8.3 Insulation voltage : 5 kV for 1 min.

3.9 Losses

: Power loss at rated current at 115°C temperature shall be less than 2.0 kW

3.10 Impregnation

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

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

GIRISH CHAND

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016



PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2555

REV. NO: 00

Page 4 of 7

Specification for 1.5mH Single Phase Line Inductor

4 List of Tests to be performed on Inductor

Sl No.	Nature of Test	Test clause as per IEC60310:2016	
		Type	Routine
1	Visual checks	13.3.3	13.3.3
2	Mass	13.3.4	13.3.4
3	Measurement of winding resistance	13.3.5	13.3.5
4	Determination of losses	13.3.6	--
5	a) Measurement of inductance	13.3.7	13.3.7
	b) Measurement of inductance with linearity up to 1.1 times of rated current	13.3.7	--
6	Temperature-rise test	13.3.8	--
7	Insulation resistance test	13.3.9	13.3.9
8	Separate source voltage withstand test	13.3.10.2	13.3.10.2
9	Lightning impulse voltage withstand test	13.3.10.3	--
10	Voltage between terminals withstand test	13.3.10.4	13.3.10.4
11	Partial discharge test	13.3.11	--
12	Shock and vibration test (as per class B (Body mounted); IEC 61373)	13.3.13	--
13	Noise measurement	13.3.15	--

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

GIRISH CHAND

K. Venkatesh

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016



PURCHASE SPECIFICATION

GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2555

REV. NO: 00

Page 5 of 7

Specification for 1.5mH Single Phase Line Inductor

5 Test Protocol

Supplier shall submit immediately after the receipt of the order, test protocol for Routine and Type tests as per clause 4 of this specification for BHEL approval.

Type tests to be conducted in any accredited lab in India / abroad.

6 Pre-shipment Inspection

Pre-shipment inspection for (Indian supplier) will be carried out by BHEL engineers as per the approved test protocol. BHEL engineers will witness Routine and Type tests before dispatch.

Foreign vendors shall submit the Type test report conducted at any accredited laboratory in India or abroad.

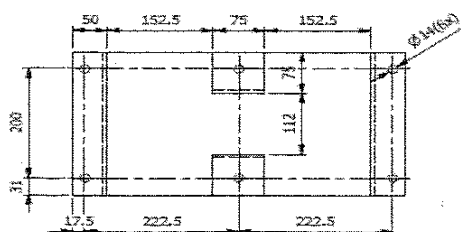
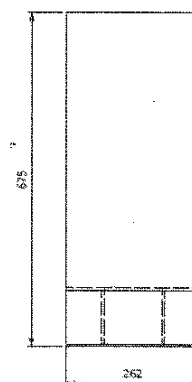
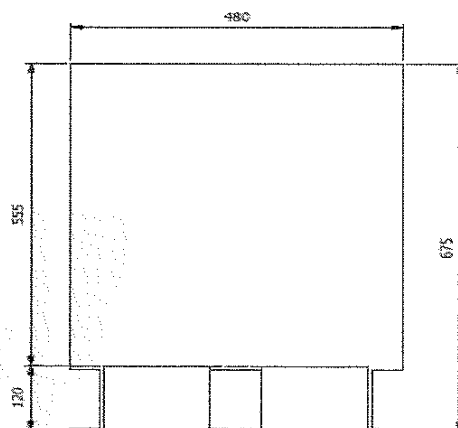
7 Mechanical dimension limitation

Below are the limiting Dimensions. Supplier has to manufacture the inductor within these limits. Mounting hole/foot print has to be matched as given below. Supplier has to submit dimensional drawing to BHEL along with quotation.

Width:480mm

Height: 675mm

Depth:262mm



COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in any way detrimental to the interest of the company.

REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

GIRISH CHAND

K. Venkatesh

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016



A4-12

PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2555

REV. NO: 00

Page 6 of 7

Specification for 1.5mH Single Phase Line Inductor

8 Documentation

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

8.1.1 Supplier shall furnish clause wise confirmation/comments to the technical specification. 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. PS/445/2555".

8.1.2 Supplier shall take a copy of this specification and sign on each page and submit the signed copy along with offer to confirm that the supplier has understood the specification and will comply with all clauses of this technical specification.

8.1.3 Outline General Arrangement (OGA) and dimensional and mounting details.

8.1.4 3D model in STEP/IGES formats for verifying the proposed inductor dimensions.

8.1.5 Power loss as per clause 3.9.

8.2 Information required after placement of order

8.2.1 Detailed dimensional drawing for BHEL approval. Vendor to start manufacture only after obtaining BHEL approval.

8.2.2 Test protocol for BHEL approval.

8.3 Information required along with material supply

8.3.1 Two sets of Test certificates.

8.3.2 BHEL engineer witnessed Pre inspection report OR Type test reports from accredited lab as mentioned in clause 6.

9 Acceptance

9.1 Dimensions as per approved drawing and submitted 3D drawings.

9.2 Type test certificates (for first time supply)

9.3 Routine test certificates (for regular supplies).

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS	00	APPROVED BY	
		VENKATESHALU K	
		PREPARED BY	ISSUED BY
		GIRISH CHAND	TRACTION ENGG.
			DATE
			17.10.2016



PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2555

REV. NO: 00

Page 7 of 7

Specification for 1.5mH Single Phase Line Inductor

10 Rating plate details

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

- Manufacturer's name;
- Manufacturer's type designation or number.
- Manufacturer's serial number;
- Date and place of manufacturing;
- Connection diagram;
- Tapings;
- Rated power, voltage and frequency of each winding;
- Rated current (R.M.S. value, or mean direct current);
- Value of the inductance (at one or more specified refer current values);
- Identification of cooling method;
- Total mass.
- Application.
- BHEL specification no: PS/445/2555.

11 Environmental conditions

11.1	Ambient Temperature	55°C
11.2	Maximum Temperature	75°C (when locomotive standing dead under sun) 60°C (when locomotive working)
11.3	Average Temperature	47°C
11.4	Humidity	Up to 100% during rainy season
11.5	Altitude	up to 1776 m above mean sea level
11.6	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

12 Reference Standards

IEC 60076	Power transformers
IEC 60077-1	Railway applications – electric equipment for rolling stock-part 1.
IEC 60085	Thermal evaluation and classification of electrical insulation
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/IEC61558-2-16	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V
EN50124-1,IEC1376	Railway Applications - Insulation Coordination Basic Requirements - Clearance And Creepage Distances
IEC60571/EN50155	Operating conditions

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS	00	APPROVED BY		
		VENKATESHALU K		
		PREPARED BY	ISSUED BY	DATE
		GIRISH CHAND	TRACTION ENGG.	17.10.2016



A4-12

PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2560

REV. NO: 00

Page 1 of 7

Specification for 1.3mH 3-Phase Sine Filter Inductor

Code No.:

REVISION HISTORY SHEET

REV. NO.	DATE	NATURE OF ISSUE	REASONS	PREPARED BY	APPROVED BY
00	17.10.2016	First issue		Girish Chand	Venkateshalu K.

COPYRIGHT AND CONFIDENTIAL

The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

GIRISH CHAND

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016

Specification for 1.3mH 3-Phase Sine Filter Inductor

1 General Instructions

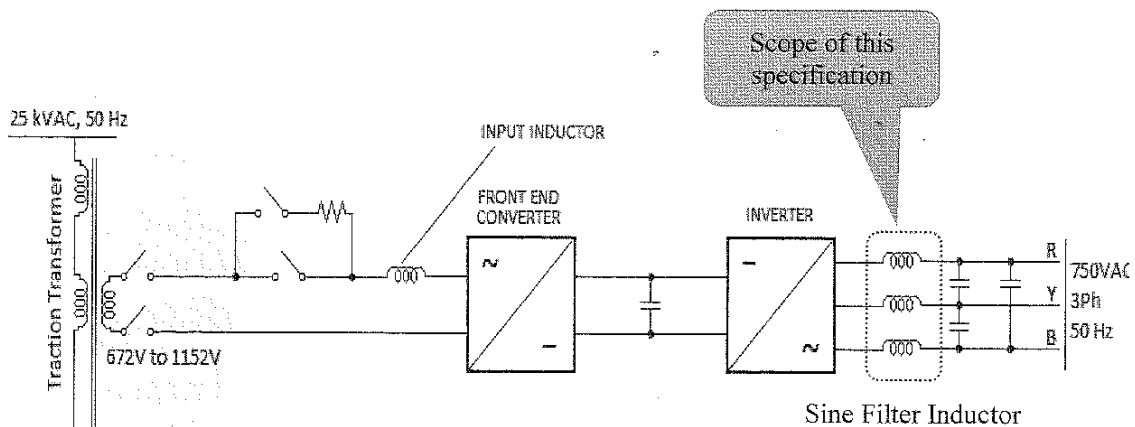
Price bid: Basic price of single phase line inductor and Type test charges to be separately indicated in this bid

- For arriving at the lowest bid price, the basic inductor price and cost of type test charges will be added.
- Type test is applicable only for the first unit. Type test charges will be paid after successful completion of the tests and acceptance of test reports by BHEL.
- Type tested unit to be supplied to BHEL with unique identification mark/band, in addition to the order quantity.

Acceptance of the inductor will be only based on the successful completion and acceptance of Type test certificates by BHEL

2 Functional Requirements

This document covers specification of an sine filter inductor, to be used at the output of 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 show below indicating the sine filter inductor location.



REVISIONS	00	APPROVED BY	VENKATESHALU K	
		PREPARED BY	GIRISH CHAND	ISSUED BY
				TRACTION ENGG.
				DATE
				17.10.2016



A4-12

PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2560

REV. NO: 00

Page 3 of 7

Specification for 1.3mH 3-Phase Sine Filter Inductor**3 Technical Information****3.1 Inductance**

3.1.1 Nominal inductance : 1.3mH, Three phase

3.1.2 Tolerance limit : +/- 5%

3.2 Current

3.2.1 Rated current (rms) : 385A

3.2.2 Peak to peak current : $\pm 545A$ (max)

3.2.3 Short time over current (rms) : 750A for 3 sec

3.3 Voltage

3.3.1 Maximum voltage : 1800V

3.4 Frequency

3.4.1 Nominal frequency : 50 Hz

3.4.2 Switching frequency : 1 kHz

3.5 Core

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

3.6 Construction

: The inductor is open type. The inductor shall be compact. Winding shall be Foil.

3.7 Cooling Type

: Natural Cooling (Supplier shall also submit the air flow required)

3.8 Temperature Class

3.8.1 Thermal class of winding : H

3.8.2 Temperature rise : H (Duty class 2) as per IEC 60310

3.8.3 Insulation voltage : 5 kV for 1 min.

3.9 Losses

: Power loss at rated current at 115°C temperature shall be less than 2.1 kW

3.10 Impregnation

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

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

GIRISH CHAND

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016



PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2560

REV. NO: 00

Page 4 of 7

Specification for 1.3mH 3-Phase Sine Filter Inductor

4 List of Tests to be performed on Inductor

Sl No.	Nature of Test	Test clause as per IEC60310:2016	
		Type	Routine
1	Visual checks	13.3.3	13.3.3
2	Mass	13.3.4	13.3.4
3	Measurement of winding resistance	13.3.5	13.3.5
4	Determination of losses	13.3.6	--
5	a) Measurement of inductance	13.3.7	13.3.7
	b) Measurement of inductance with linearity up to 1.1 times of rated current	13.3.7	--
6	Temperature-rise test	13.3.8	--
7	Insulation resistance test	13.3.9	13.3.9
8	Separate source voltage withstand test	13.3.10.2	13.3.10.2
9	Lightning impulse voltage withstand test	13.3.10.3	--
10	Voltage between terminals withstand test	13.3.10.4	13.3.10.4
11	Partial discharge test	13.3.11	--
12	Shock and vibration test (as per class B (Body mounted); IEC 61373)	13.3.13	--
13	Noise measurement	13.3.15	--

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

GIRISH CHAND

klekate

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016



PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2560

REV. NO: 00

Page 5 of 7

Specification for 1.3mH 3-Phase Sine Filter Inductor

5 Test Protocol

Supplier shall submit immediately after the receipt of the order, test protocol for Routine and Type tests as per clause 4 of this specification for BHEL approval.

Type tests to be conducted in any accredited lab in India / abroad.

6 Pre-shipment Inspection

Pre-shipment inspection for (Indian supplier) will be carried out by BHEL engineers as per the approved test protocol. BHEL engineers will witness Routine and Type tests before dispatch.

Foreign vendors shall submit the Type test report conducted at any accredited laboratory in India or abroad.

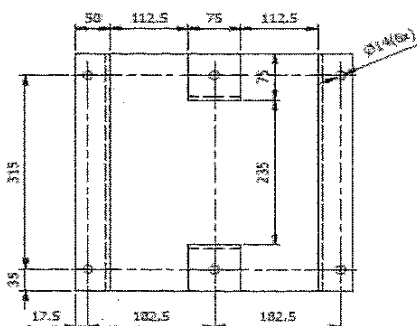
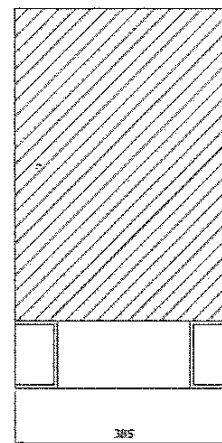
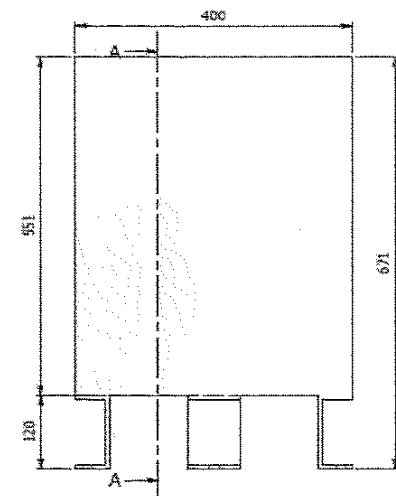
7 Mechanical dimension limitation

Below are the limiting Dimensions. Supplier has to manufacture the inductor within these limits. Mounting hole/foot print has to be matched as given below. Supplier has to submit dimensional drawing to BHEL along with quotation.

Width:400mm

Height: 671mm

Depth:385mm



COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

GIRISH CHAND

Handwritten signature

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016



A4-12

PURCHASE SPECIFICATION

GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2560

REV. NO: 00

Page 6 of 7

Specification for 1.3mH 3-Phase Sine Filter Inductor

8 Documentation**8.1 Information required along with techno commercial offer without which offer is liable for rejection.**

8.1.1 Supplier shall furnish clause wise confirmation/comments to the technical specification. 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. PS/445/2560".

8.1.2 Supplier shall take a copy of this specification and sign on each page and submit the signed copy along with offer to confirm that the supplier has understood the specification and will comply with all clauses of this technical specification.

8.1.3 Outline General Arrangement (OGA) and dimensional and mounting details.

8.1.4 3D model in STEP/IGES formats for verifying the proposed inductor dimensions.

8.1.5 Power loss as per clause 3.9.

8.2 Information required after placement of order

8.2.1 Detailed dimensional drawing for BHEL approval. Vendor to start manufacture only after obtaining BHEL approval.

8.2.2 Test protocol for BHEL approval.

8.3 Information required along with material supply

8.3.1 Two sets of Test certificates.

8.3.2 BHEL engineer witnessed Pre inspection report OR Type test reports from accredited lab as mentioned in clause 6.

9 Acceptance

9.1 Dimensions as per approved drawing and submitted 3D drawings.

9.2 Type test certificates (for first time supply)

9.3 Routine test certificates (for regular supplies).

COPYRIGHT AND CONFIDENTIAL.
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS 00

APPROVED BY

X Venkateshulu

VENKATESHALU K

PREPARED BY

GIRISH CHAND

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016



A4-12

PURCHASE SPECIFICATION

GROUP: TRACTION ENGINEERING

P. S. NO: PS/445/2560

REV. NO: 00

Page 7 of 7

Specification for 1.3mH 3-Phase Sine Filter Inductor

10 Rating plate details

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

- a) Manufacturer's name;
- b) Manufacturer's type designation or number;
- c) Manufacturer's serial number;
- d) Date and place of manufacturing;
- e) Connection diagram;
- f) Tappings;
- g) Rated power, voltage and frequency of each winding;
- h) Rated current (R.M.S. value, or mean direct current);
- i) Value of the inductance (at one or more specified refer current values);
- j) Identification of cooling method;
- k) Total mass.
- l) Application.
- m) BHEL specification no.

11 Environmental conditions

11.1	Ambient Temperature	55°C
11.2	Maximum Temperature	75°C (when locomotive standing dead under sun) 60°C (when locomotive working)
11.3	Average Temperature	47°C
11.4	Humidity	Up to 100% during rainy season
11.5	Altitude	up to 1776 m above mean sea level
11.6	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

12 Reference Standards

IEC 60076	Power transformers
IEC 60077-1	Railway applications – electric equipment for rolling stock-part 1.
IEC 60085	Thermal evaluation and classification of electrical insulation
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/IEC61558-2-16	Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1100 V
EN50124-1, IEC1376	Railway Applications - Insulation Coordination Basic Requirements - Clearance And Creepage Distances
IEC60571/EN50155	Operating conditions

COPYRIGHT AND CONFIDENTIAL
 The information on this document is the property of BIHARAT HEAVY ELECTRICALS LIMITED.
 It must not be used directly or indirectly in anyway detrimental to the interest of the company.

REVISIONS 00

APPROVED BY

VENKATESHALU K

PREPARED BY

GIRISH CHAND

ISSUED BY

TRACTION ENGG.

DATE

17.10.2016