

Instruction to bidders and terms & conditions for supply of Cold Rolled Grain Oriented (CRGO) steel laminations on finished and stacked basis under enquiry (E1453054) for BHEL Bhopal Unit (India) – 243066.6 kgs.

Offers through GeM's e-procurement portal <https://gem.gov.in> are invited in Two-Part Bid system for purchase of **23HP90d** grade of CRGO laminations on finished and stacked basis as per terms and conditions below.

General: Enquiry will be governed by below mentioned technical and commercial terms for supply of Cold Rolled Grain Oriented (CRGO) Laminations in conformity with BHEL specification BP10985 rev.05 for requirement of BHEL Bhopal.

The supplies against this enquiry shall be subject to GeM's general Terms and conditions of enquiry and PO. In addition, the terms and conditions given under this annexure shall specifically apply to this enquiry.

- 1. Technical terms and condition** detailed herein along with BHEL specification BP10985 rev.05 (**23HP90d** or equivalent or superior as per IS3024: 2015) mentioned under scope of contract will govern supply of CRGO Laminations.
- 2. Quantity & bid evaluation:** Tentative quantity for **23HP90d** or equivalent or better grade of CRGO Laminations in terms of core losses is as under:

(all quantities in kg)

It. No	Item description	Per set qty.	Total no. of sets	Total qty.	Total qty. with+1% tolerances.	Delivery per set
1	CRGO laminations in grade 23HP90d or equivalent as per BHEL specification BP10985 Rev 05 core computed drg no. 34647000419	120330	2	240660	243066.6	Jan 2026
						Feb 2026
Total			2	240660	243066.6	

Quantity is subject to variation of -0/+1%. Bidders can also quote superior grade material (in terms of core losses). Acceptance / rejection of the same shall be in purview of BHEL. Total supply quantity is to be restricted between 240660 kgs & 243066.6 kgs. Negative tolerance is not permitted.

- 3. Raw material sources:** CRGO laminations are to be made from CRGO steel (mother coil) grade (**23HP90d** or equivalent or superior in terms of core losses as per IS 3024:2015). For subject requirement raw material – CRGO coils supplying mills & CRGO laminations processors must be approved by M/s Odisha Power Transmission Corporation Limited. Approved CRGO mills are as below:

ITEM	VENDOR	PLACE
CRGO	M/S AK STEEL INTERNATIONAL B.V.	NETHERLANDS
	M/S JFE SHOJI STEEL INDIA PVT. LTD.	PUNE
	M/S JFE SHOJI TRADE CORPORATION	JAPAN
	M/S METAL ONE CORPORATION	JAPAN
	M/S POSCO-INDIA PUNE PROCESSING CENTRE PVT LTD.	PUNE
	M/S THYSENKRUPP ELECTRICAL STEEL GMBH	GERMANY
	M/S THYSENKRUPP ELECTRICAL STEEL INDIA PVT. LTD.	NASHIK
	M/S BAOSHAN STEEL SINGAPORE PTE LTD.	SINGAPORE
	M/S NLMK INDIA SERVICE CENTER PVT LTD.	DAMAN
	M/S NLMK TRADING SA.	SWITZERLAND

If, bidder intends to supply CRGO laminations from any other BIS approved mill, same should be approved by OPTCL. Participating CRGO laminations processors should also be approved by OPTCL. Relevant approval letter for CRGO supplying mill & CRGO laminations processor to be submitted with the offer in case offered mill and lamination processor names are not in OPTCL approved list. In case, participating bidder / lamination processor is not approved by OPTCL, bidder is requested to take up immediately with customer – OPTCL for approval and submit the same within 10 days from date of bid part – 1 opening. Decision regarding acceptance of mill other than those listed above by OPTCL shall be final and binding.

NIT (Notice Inviting tender) for E1453054 – CRGO laminations on finished and stacked basis

For any query regarding above, following may be contacted:

Name:	Abhishek Sharma	A. Chiranjeevi	Vineet Suman
Designation:	Sr. Manager	Manager	Sr. Manager
Department:	Transformer - Quality	Transformer - Planning	CMM - Steel
Contact details:	+91 755 – 250 3707	+91 755 – 250 3098	+91 755 – 250 5805
Email:	aksharma1@bhel.in	achiranjeevi@bhel.in	vineetsuman@bhel.in

4. PQR (pre-qualifying requirement) condition (s):

- Lamination processor to submit valid Certificate of Conformity of BIS as on bid part – 1 opening date as per latest Quality Control Order issued by Government of India
- CRGO laminations processor shall be approved by M/s OPTCL on tender bid part-I opening date for supply of 500MVA 400/220/33kV transformers.

Important note:

- All circulars issued by Government of India affecting any of the above conditions directly / indirectly shall supersede the above-mentioned conditions.
- All the Annexures – I, II, III, IV & V to be duly signed and stamped and submit along with part – I bid.

5. Supply conditions: Tentative shipment / delivery shall be within 30 days for 1st lot / set and within 60 days for 2nd lot / set from Purchase order (PO) OR contractual delivery, whichever is later from date of award of formal PO. Expected shipment dates beyond contractual delivery may change subject to mutual consent. Tentative requirement of materials against this enquiry for BHEL- Bhopal is by January & February 2026.

Laminations are to be cut on CNC cropping line only. CRGO laminations are to be made as per BHEL drawing provided for each purchase order. Number of sheets specified per stack per width should be ensured. Stack height is very important and to be maintained, weight may vary slightly. Clarification should be immediately taken from BHEL Bhopal, if stack height is not achieved.

Tolerance of + 1% in total weight per PO will be permissible to achieve required stack height and completeness of laminations. If total weight of laminations required exceeds PO quantity with permissible tolerance, prior approval shall be obtained from Transformer Engineering. All the limbs, Centre leg, side leg, yoke and fishes shall be supplied duly stacked in ready to build to core condition. Clarification, if any, to be taken from TRM/ TRE, BHEL Bhopal.

6. Inspection and Test certificates: -

- Supplier shall submit Mill TC of raw material CRGO coils along with commercial documents - Bill of Lading, Bill of entry, Commercial invoice and packing list evidencing purchase of genuine CRGO coils for BHEL's lamination job for each purchase order. Mill TC shall be submitted before processing the job for approval / inspection from BHEL QC to avoid any quality complaints in future. Mill TC of CRGO coils shall clearly bear BIS mark with license number of the supplying mill.
- BHEL Quality / customer / TPIA will review TC or inspect coil at vendor works and accord clearance for processing laminations within 10 days (considering inspection duration and testing of samples at competent accredited testing lab as per ISO 17025. Certificate shall contain accreditation & Accreditation Symbol) of submission of complete mill TC, clarifications and other documents if required any. Mill TC shall be as per BHEL specifications. No delivery extension request will be considered in case of delay by supplier in submission of complete documents and clarifications. BHEL will not be responsible for LD penalty due to delay in submission of mill TC or clarifications by vendor.
- Test certificates should cover result of tests for mechanical and electrical properties as per specification and IS 3024:2015 for each coil No/ Heat No.
- Dimensions and tolerances shall be as per specifications and IS 3024:2015 and a clause confirming same shall be mentioned clearly in mill TC submitted.
- Inspection shall be done by customer at vendor works. Customer – OPTCL shall witness both raw material – prime CRGO coils and laminations processing at vendor works. Supplier shall give inspection call at least 10 days in advance for both cases.**
- Raw material and finished laminations testing are in supplier's scope wherever required as per Quality Plan. Inspection both RM and final stage shall be done by customer / BHEL at vendor works. Supplier shall have to inform raw material – RM (CRGO coils) readiness to be inspected by customer / BHEL. Customer / BHEL shall witness laminations processing at vendor works. Supplier to inform the schedule of laminations processing well in advance to BHEL.

NIT (Notice Inviting tender) for E1453054 – CRGO laminations on finished and stacked basis

- VII. Magnetic properties including Maximum specific total loss and magnetic permeability measurement will be done by Single Sheet method (for domain refined grade) and Epstein method (for other grades) as per IS 3024:2015 & acceptance norm as elaborated in IS 3024:2015. For RM stage and final stage inspection as mentioned in concerned Quality Plan, Samples of shall be selected by BHEL/Customer and testing (in the scope of supplier) shall be done in laboratory having valid accreditation from MRA signatories of ILAC/APLAC against ISO 17025. For final acceptance at BHEL, results obtained at BHEL lab will be final and binding for acceptance of material.

7. Tests and procedure: Test certificate shall clearly indicate following information:

- I. Supplier's name, Grade, Identification no., Size and weight, Packet/ Bundle no.
- II. Test results of dimensions and tolerances
- III. Details of insulation coating
- IV. Type test as required
- V. Properties of total Specific loss of each coil, magnetic permeability, surface insulation resistivity, total specific loss on aged specimen (type test), ductility/bend test and stacking factor of each coil. Separate declaration from Mill for properties not mentioned in TC may also be accepted. Mechanical and Electrical properties mentioned will be tested for one Sample of each lot.
- VI. Results of chemical composition (for information only, if required). Supplier shall enclose one copy of test certificate as per above along with dispatch documents to facilitate clearance/ acceptance of finished laminations. After making core with supplied laminations the core losses shall be measured at BHEL Bhopal & results shall be binding.
- VII. It will be reviewed with respect to the Test certificates of raw material / lamination provided by Supplier. Supplier shall be responsible for higher losses if any. In case of higher losses, BHEL reserves the right to reject full lot.
- VIII. Test certificate of CRGO cut laminations should indicate traceability record of CRGO coil, slitting & length dimension, Burr level, bow level, Edge camber and waviness.
- IX. Testing of raw material and cut lamination shall be as per IS 649 & IS 3024.

8. **Bid opening:** - The 'Techno-commercial' part of the bid i.e. Bid Part – I of the offers shall be opened on the due date of tender opening **on GeM portal**. Clarifications if required on this part may be obtained from the bidders for their evaluation. The Price bid Part-II of such bidders alone shall be opened on a later date **on GeM portal** whose techno-commercial bids are found acceptable. The date of 'Price bid –Part II' opening shall be intimated to technically qualified bidders later.

9. Price finalization shall be done through price bid opening and through reverse auction as per GeM terms and conditions.

10. **Delivery period:** Delivery period shall be quoted in number of days from PO date or as per agreed commercial conditions. BHEL prefers delivery to be within 30 days for 1st lot / set and within 60 days for 2nd lot / set from Purchase order (PO). Early deliveries will be acceptable with mutual consent. Item wise PO shall be placed separately. **Supply requirement against this enquiry for BHEL- BHOPAL shall be by January & February 2026.**

11. **Terms of delivery:** F.O.R. destination on door delivery basis (BHEL Bhopal).

12. **Levy of Penalty for delayed performance:** As per latest GeM guidelines. On LD recovery, the applicable GST shall also be recoverable from indigenous vendors. Receipt of material at BHEL (CN date i.e., material entry date in BHEL) will be taken as proof of delivery for indigenous bidders.

13. **Replacement of rejected goods:** Final inspection for acceptance of material shall be at BHEL's works after testing during core building stage and results shall be binding on the suppliers. Rejected goods are to be lifted and replacements to be supplied immediately free of cost by the vendor. It will be dealt as per latest GeM guidelines.

14. **Payment Terms:** - As per latest GeM guidelines.

MSME Suppliers may opt for the below payment terms:

- I. **Micro & Small enterprises** - Within 45 days from receipt & acceptance of materials at BHEL-BHOPAL.
- II. **Medium enterprises** - Within 60 days from receipt & acceptance of materials at BHEL-BHOPAL.
- III. MSME vendors may opt for payment through TReDS (Trade Receivables Discounting System). MSME vendors may register on (1) RXIL- Receivables Exchange of India Ltd (2) Invoice mart- M/s A. TREDs Ltd (3) M1xchnage-M/s Mynd Solutions Pvt Ltd (4) DTX-M/s KredX Platform Pvt Ltd authorized by RBI for TReDS and approved by BHEL. No overdue interest shall be payable by BHEL. Bidder must attach UDYAM certificate along with bid to confirm their category.

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Bidders intending to avail MSME benefit shall have to submit annexures – IV duly filled with sign and seal on their letter head along with other statutory documents.

15. Transit Insurance: - All type of risks to be covered in Insurance policy and in supplier scope only.

16. Validity of Offer: Offer should be valid for a period of 90 days from the date of technical bid opening date for finalization of the contract. In case, validity lower than 90 days is provided, bids shall be liable for rejection.

17. Taxes & Duties: -

- The bidders are requested to furnish the rate and type of duty / taxes as extra applicable to the product under this enquiry in their bid (along with details like HSN, SAC codes, GSTIN no. of vendor etc).
- Indian Bidders-Bidders to ensure timely remittance of SGST, CGST, IGST as applicable in time as per law.
- Vendor to ensure compliance to timely filing of monthly GST return. GST portion of invoice shall be released only upon the invoice being reflected in GSTR 2A of BHEL and invoices being compliant to GST Invoice rules.

BHEL will avail tax credit as per GST rules. Vendors to note that GST portion of invoice amount shall be released only upon:

- Vendor declaring such invoice in his GSTR – 1 and
- Receipt of goods and tax invoice by the BHEL and
- Confirmation of payment of GST thereon by vendor on GSTN portal.
- Above is subject to receipt of goods and tax invoice thereof along with vendor declaring invoice in his return and paying GST within timeline prescribed for availing TC by BHEL.

In case, GST credit is delayed / denied to BHEL due to non / delayed receipt of goods and / or tax invoice or expiry of timeline prescribed in GST law for availing such ITC (Input Tax Credit) or any other reasons not attributable to BHEL, GST amount shall be recoverable from vendor along with interest levied / leviable on BHEL. In case, vendor delays declaring such invoice in his return and GST credit availed by BHEL is denied or reversed, subsequently as per GST law, GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from vendor along with interest levied / leviable on BHEL. Further, any GST liability arising on BHEL under RCM (Reverse Charge) before actual receipt of goods and / or invoice thereof would be subject to recovery of interest leviable for the period between the date of such liability and actual date of eligibility of ITC based on receipt of goods, receipt of invoices and other conditions specified in GST law.

18. Integrity Pact: The integrity pact submitted along with the current rate contract will be considered valid for the duration of contract.

19. Short closure: BHEL reserves right to short close the contract for quantities anytime during the tenure of the contract.

20. Fraud prevention policy: Fraud prevention Policy of GeM is to be complied.

21. Compliance to **MAKE IN INDIA circular issued by Gol:**

“For this procurement, the local content to categorize a supplier as a Class I local supplier / Class II local supplier / Non-Local supplier and purchase preference to Class I local supplier, is as defined in Public Procurement (Preference to Make in India), Order 2017 dated 19.07.2024 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT”

To avail purchase preference under Make in India guidelines, vendor should be categorized as Class 1 supplier. For a vendor to be classified as Class 1 supplier, bidder & their mill from which support letter has been furnished shall have to submit annexure – III with seal and sign duly ratified / verified by statutory auditor or cost auditor of the company (in case of companies) or from a practicing-chartered accountant (in respect of suppliers other than companies) giving the percentage of local content.

22. Prevention of conflict of Interest among bidders/agent: Treatment of cases regarding conflict of interest:

The bidder notes that a conflict of interest would said to have occurred in the tender process and execution of the resultant contract, in case of any of the following situations:

- i. If its personnel have a close personal, financial, or business relationship with any personnel of BHEL who are directly or indirectly related to the procurement or execution process of the contract, which can affect the decision of BHEL directly or indirectly;
- ii. The bidder (or his allied firm) provided services for the need assessment/ procurement planning of the Tender process in which it is participating;
- iii. Procurement of goods directly from the manufacturers/ suppliers shall be preferred. However, if the OEM/ Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. In case bids are received from both the manufacturer/ supplier and the agent, bid received from the agent shall be ignored. However, this shall not debar more than one Authorized distributor (with/ or without the OEM) from quoting equipment manufactured by an Original Equipment Manufacturer (OEM) in procurements under a Proprietary Article Certificate.
- iv. A bidder participates in more than one bid in this tender process. Participation in any capacity by a Bidder (including the participation of a Bidder as a partner/ JV member or sub-contractor in another bid or vice-versa) in more than one bid shall result in the disqualification of all bids in which he is a party. However, this does not limit the participation of an entity as a sub-contractor in more than one bid if he is not bidding independently in his own name or as a member of a JV.

The Bidder declares that they have read and understood the above aspects, and the bidder confirms that such conflict of interest does not exist and undertakes that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s), in this regard. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

Annexure – V to be duly filled with seal and sign. In case, the Bidder is found having indulged in above activities, the same will be considered as a violation of the tender conditions, and suitable action shall be taken by BHEL as per extant policies/ guidelines.

23. Corrigendum / addendum: Any corrigendum/addendum related to this tender shall be updated on GeM portal <https://gem.gov.in>. Bidders are requested to regularly visit the BHEL website to keep themselves abreast with updates.

24. Bidders are advised to read the latest Government circular/OM/Notices etc. issued by Government of India & BHEL (wherever applicable to BHEL, shall be follow).

- i. BHEL's PO conditions for indigenous bidders (attached).
- ii. Latest Order (Public procurement no-4 dtd. 23.02.2023) subject: Restrictions under rule144 (Xi) of general financial rules GFRs, 2017 shall be applicable along with subsequent order issued by Government of India (Ministry of Finance).
- iii. General terms and conditions as per GeM shall be applicable.

25. BHEL shall not be releasing any additional document other than formal PO in case contract is finalized with a bidder. For any queries, please contact the undersigned:

Name:	Dharmendra Singh	Madhurendra Manderwal	Vineet Suman
Designation:	AGM	DGM	Sr. Manager
Department:	CMM – Steel, Copper & FE	CMM – FE & Steel	CMM - Steel
Contact details:	+91 755 – 250 3360	+91 755 – 250 5210	+91 755 – 250 5805
Email:	dharmendra2000@bhel.in	madhurendra@bhel.in	vineetsuman@bhel.in

Other salient parameters for compliance in tender E1453054:

Sr. No	Conditions	Vendors compliance/acceptance (Yes/No)
1	Confirmation about UOM (Unit of Measurement) & currency in which you have quoted i.e. INR / kg OR INR / MT.	(Yes / No)
2	Confirm whether you have quoted your rate inclusive of GST. (*please quote rate inclusive of GST only.)	(Yes / No)
3	Acceptance to supplies as per BHEL's specification BP 10985 rev.05.	(Yes / No)
4	Confirmation that tendered quantity for each item of enquiry has been offered.	(Yes / No)
5	Quoted delivery period. Material requirement shall be by January & February 2026 (within 30 days for 1 st lot / set and within 60 days for 2 nd lot / set from Purchase order (PO).	(Delivery period to be quoted in no. of days)
6	Acceptance of penalty clause as per standard GeM terms	(Yes / No)
7	Acceptance to clause 3 of annexure – I wherein the mill from where CRGO coils are to be sourced should holds a valid BIS license of offered grade in the tender. Also, CRGO supplying mill & CRGO laminations processor (participating bidder) are approved by OPTCL (mill should be anyone listed at sl.no. 3 of annexure – I)	(Yes / No)
8	Acceptance to bid evaluation criteria including quantity tolerance as per clause 2 of annexure – I	(Yes / No)
9	Acceptance to general terms and conditions as per GeM.	(Yes / No)
10	Acceptance to fraud prevention Policy of GeM.	(Yes / No)
11	Acceptance of inspection clause: Inspection shall be done by customer at vendor works. Customer – OPTCL shall witness both raw material – prime CRGO coils and laminations processing at vendor works. Supplier shall give inspection call at least 10 days in advance for both cases	(Yes / No)
12	Acceptance of standard payment term of GeM.	(Yes / No)
13	Declaration as per annexure – V submitted regarding conflict of interest clause.	(Yes / No)
14	Acceptance to all other additional terms and conditions of NIT as per annexure - I	(Yes / No)
15	Acceptance to Integrity Pact clauses. Integrity Pact duly signed on each page & filled to be submitted with the offer.	(Yes / No)
16	Confirmation that only one grade & type of CRGO steel to be used for manufacturing of one set.	(Yes / No)
17	Confirmation that validity of offer shall be 90 days from date of bid part – 1 opening date.	(Yes / No)

(Seal & sign of the bidder)

MAKE IN INDIA format (to be filled by OEMs of the participating bidders)

BHARAT HEAVY ELECTRICALS LIMITED, BHOPAL

MATERIAL MANAGEMENT – STEEL DIVISION

For this Procurement, Government of India Public Procurement (Preference to Make in India), Order 2017 with its amendments and subsequent Orders issued by the respective nodal ministries shall be applicable even if issued after issue of this NIT but before finalization of contract/PO/WO against this NIT.

*As per the Provisions of this order, please submit **a self-certification complying with the conditions below on company letterhead duly signed by competent authority.***

I _____, hereby declare on behalf of M/s. _____ that we are participating in the Enquiry No. _____ floated by BHEL, Bhopal (MP), India and shall comply with following:

1. Public Procurement (Preference to Make in India), Order 2017 *with its amendments* and subsequent Orders issued by the respective nodal ministries shall be applicable even if issued after issue of this NIT but before finalization of contract/PO/WO against this NIT.

(a) A supplier will be treated as **“Class-I Local Suppliers”**, if the items quoted by bidder have local content equal to or more than 50%.

(b) **‘Local Content’** means the amount of value added in India, which shall be total value of item quoted (excluding net domestic indirect taxes) minus the value of imported content in the item (including all custom duties) as a proportion of the total value, **in percent**.

2. I hereby declare that our firm qualifies as **“Class-I Local Suppliers”**.

a. The Local Content in the items quoted under this Enquiry is _____ Percent

b. Details of location(s) in India where this value addition shall be done, is/are as follows:

- (a) _____
(b) _____
(c) _____

(_____)

For M/s.

(Seal & Sign)

DECLARATION
(to be given by Bidder)

In pursuant to the Public Procurement Policy for MSEs Order, 2012, I/We declare(s) that My/Our firm is(are) falling under the following MSE category and I/we are submitting documentary evidence/ Govt. Certificate etc. along with UDYAM certificate in support of the same along with the techno-commercial offer.

Type under MSE	SC Owned	ST Owned	Women Owned	Others (excluding SC/ST & Women Owned)
Micro				
Small				

(√ Tick whichever is applicable)

Note: If the bidder does not furnish the above in the tender, offer shall be processed construing that the bidder is not falling under MSE category.

Signature of Authorized Signatory

Name:

Designation:

Stamp / Seal of Firm

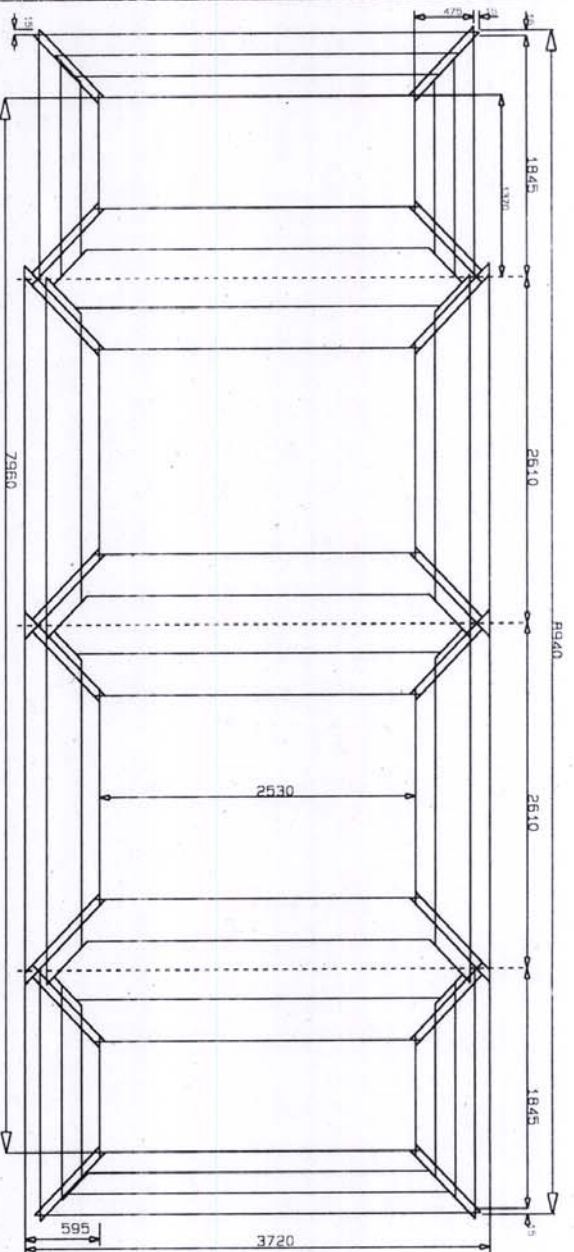
DECLARATION
(to be given by Bidder)

Conflict of interest would said to have occurred in the tender process and execution of the resultant contract, in case of any of the following situations:

- 1) If its personnel have a close personal, financial, or business relationship with any personnel of BHEL who are directly or indirectly related to the procurement or execution process of the contract, which can affect the decision of BHEL directly or indirectly.
- 2) The bidder (or his allied firm) provided services for the need assessment/ procurement planning of the Tender process in which it is participating.
- 3) Procurement of goods directly from the manufacturers/ suppliers shall be preferred. However, if the OEM/ Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer/ supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer/ supplier or the manufacturer/ supplier could bid directly but not both. In case bids are received from both the manufacturer/ supplier and the agent, bid received from the agent shall be ignored. However, this shall not debar more than one Authorized distributor (with/ or without the OEM). from quoting equipment manufactured by an Original Equipment Manufacturer (OEM) in procurements under a Proprietary Article Certificate.
- 4) A bidder participates in more than one bid in this tender process. Participation in any capacity by a Bidder (including the participation of a Bidder as a partner/ JV member or sub-contractor in another bid or vice-versa) in more than one bid shall result in the disqualification of all bids in which he is a party. However, this does not limit the participation of an entity as a sub-contractor in more than one bid if he is not bidding independently in his own name or as a member of a JV.

I/We declares that I/We have read and understood the above aspects, and confirms that such conflict of interest does not exist and undertakes that I/We will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s), in this regard. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process. In case, I am /We are, found having indulged in above activities, the same will be considered as a violation of the tender conditions, and suitable action shall be taken by BHEL as per extant policies/ guidelines.

Signature of Authorized Signatory
Name:
Designation:
Stamp / Seal of Firm



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B - Type Of Core - 5 Limbed Elliptical Yoke Core
Only Top Yoke Bolted

Core Dia = 1080.0 Leg Length = 2530.0
Leg Centre = 2610.0 Dist bet Outer Legs = 7960.0
No of Oil ducts = 5 No of steps = 20
Yoke Bolts/Window = 0
Space Factor = 0.570 Top Clearance = 49.0
Scrap Factor = 2.5%
Blading = 4/4 Grade of Core Steel = ZOKH90/0.23 (Q15 Grade: 23HF90d)

Notes :

- 1 - Laminations to be cut with max dimensions along the grain
- 2 - For tolerances and burr level on laminations, refer Std Snt TH0141C
- 3 - All cores are to be built up with mitre joints and mitring to be at 45 degrees
- 4 - Each packet to be built with 4 laminations per layer alternately as per P and Q arngts.
- 5 - Bind the core with polyester resin impreg. wetless glass tape (to AA25/16) after putting core to coil packing in position. Each band shall consist of 3 turns of 0.4 tk or 4 turns of 0.3 tk polyester impreg. wetless glass tape. For detailed instructions regarding core leg clamping/taping/candring refer Std Snt TH0142C
- 6 - No of Tape bands = 18. Tape Pitch = 134 mm Distance of 1st band from bottom = 100 mm
- 7 - Refer drg no. 3469700065 for arngt of ceramic spacers on core and yoke laminations to provide oil duct
- 8 - Assembled core to be tested between core and clamping structure at 2 kv for one minute unless otherwise specified

INVENTORY NO. SIGN AND DATE REF DRG NO.

DISTRIBUTION OF PRINTS
W.O. 63202A51201



BHARAT HEAVY ELEC. LTD

BHO PAL



REV	DATE	NO. OF
01	30/10/13	1
02	31/12/13	1
03	10/1/14	1

TITLE

Core Dimensions

500MVA 400/220/33 KV OPTOL (without-OLTC)

DRAWING NO

34647000419

Sht NO. 1

NO. OF SHTS 7

REV

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NO	PKT-THK	DUCT	PKT-HT	LEG/LAM	---	MYOK/LAM---	---	AYOK/LAM---	---	ALEG/LAM
					Top	Bot	Top	Bot		
1	67	2	69.0	1070.0	595.0	595.0	475.0	475.0	475.0	475.0
2	31		100.0	1060.0	590.0	590.0	470.0	470.0	470.0	470.0
3	43		143.0	1040.0	580.0	580.0	460.0	460.0	460.0	460.0
4	32		175.0	1020.0	570.0	570.0	450.0	450.0	450.0	450.0
5	22	4	201.0	1000.0	560.0	560.0	440.0	440.0	440.0	440.0
6	23		224.0	980.0	550.0	550.0	430.0	430.0	430.0	430.0
7	30		254.0	950.0	535.0	535.0	415.0	415.0	415.0	415.0
8	26		280.0	920.0	520.0	520.0	400.0	400.0	400.0	400.0
9	23		303.0	890.0	505.0	505.0	385.0	385.0	385.0	385.0
10	21		324.0	860.0	490.0	490.0	370.0	370.0	370.0	370.0
11	15	4	343.0	830.0	475.0	475.0	355.0	355.0	355.0	355.0
12	22		365.0	790.0	455.0	455.0	335.0	335.0	335.0	335.0
13	21		386.0	750.0	435.0	435.0	315.0	315.0	315.0	315.0
14	18		404.0	710.0	415.0	415.0	295.0	295.0	295.0	295.0
15	17		421.0	670.0	395.0	395.0	275.0	275.0	275.0	275.0
16	15		436.0	630.0	375.0	375.0	255.0	255.0	255.0	255.0
17	13		449.0	590.0	355.0	355.0	235.0	235.0	235.0	235.0
18	16		465.0	540.0	330.0	330.0	210.0	210.0	210.0	210.0

NO	PKT-THK	DUCT	PKT-HT	LEG/LAM	---	MYOK/LAM---	---	AYOK/LAM---	---	ALEG/LAM
					Top	Bot	Top	Bot		
19	13		478.0	490.0	305.0	305.0	185.0	185.0	185.0	185.0
20	10		488.0	440.0	280.0	280.0	160.0	160.0	160.0	160.0

Cross section Area- Gross, sq.cm	Net, sq.cm
Main Leg	8473.6
Main Yoke Top	4810.4
Main Yoke Bot	4810.4
Aux Yoke Top	3663.2
Aux Yoke Bot	3663.2
Aux Leg	3663.2

INVENTORY NO SIGN AND DATE REF DRG NO

DISTRIBUTION OF PRINTS
M.O. 63202A51201



BHARAT HEAVY ELEC. LTD
BHOPAL

SCALE N.T.S

WEIGHT

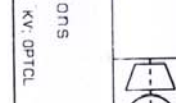
NAME SION DATE NO OF VAR

REF. TO ASSY DRG. 11 NO 10/1/04

NO

REV DATE
CHECKED
DATE

DEPT THE
UNTO. DRG. DR.



TITLE
Core Laminations
500MVA 400/250/33 KV. OPTCL

DRAWING NO
34647000419

SHT NO. 2 NO OF SHTS 17

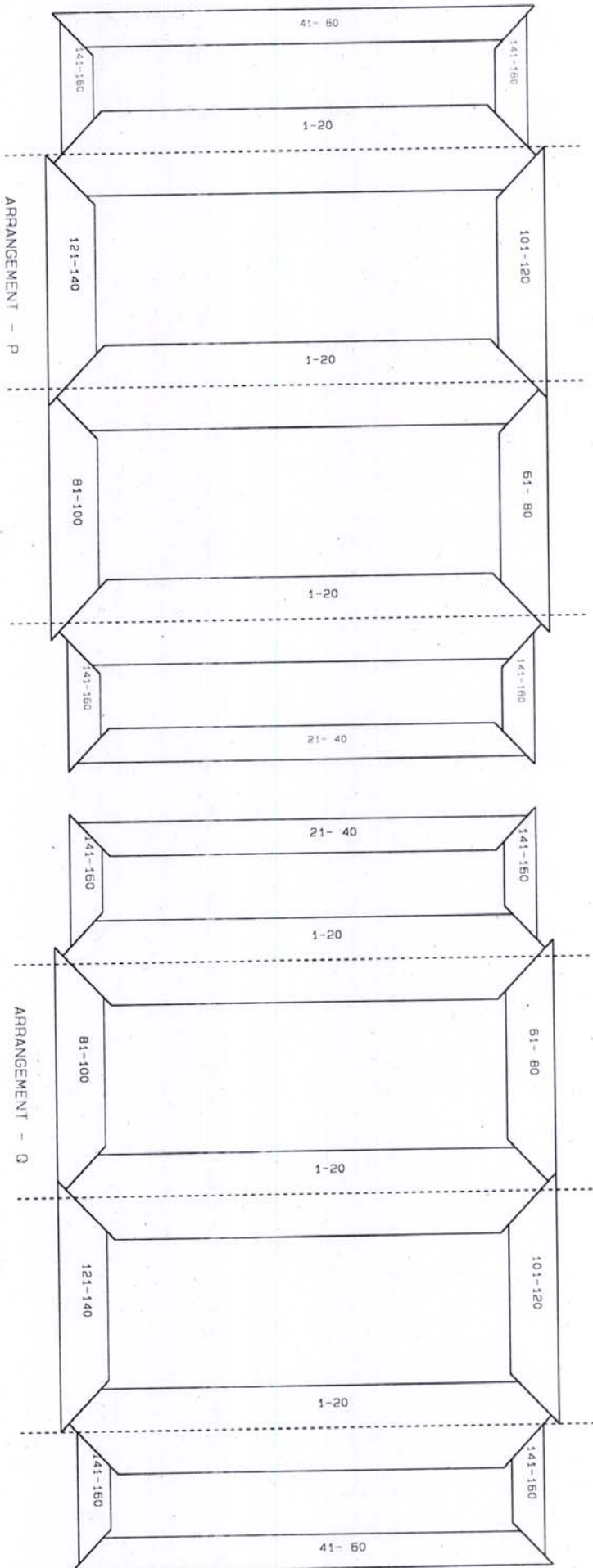
REV
00

First Angle Projection

6170007494E

ON DRG

All dimensions in mm



NOTE :-

For items 1 to 20, each of the items with lamination width greater than 750 mm appears in two split parts. Part A and Part B and item nos. are suffixed by A and B respectively. However for lamination width less than 750 mm the items appear as single parts only and so item nos. do not have suffixes

INVENTORY NO. SIGN AND DATE REF. DRG. NO.

DISTRIBUTION OF PRINTS
M.O. 63202A51201



BHARAT HEAVY ELEC. LTD.
BHO PAL



SCALE
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WEIGHT

REF. TO ASSY DRG.

IT NO.

DRAWING NO.

34647000419

SHT NO. 4

NO OF SHTS. 17

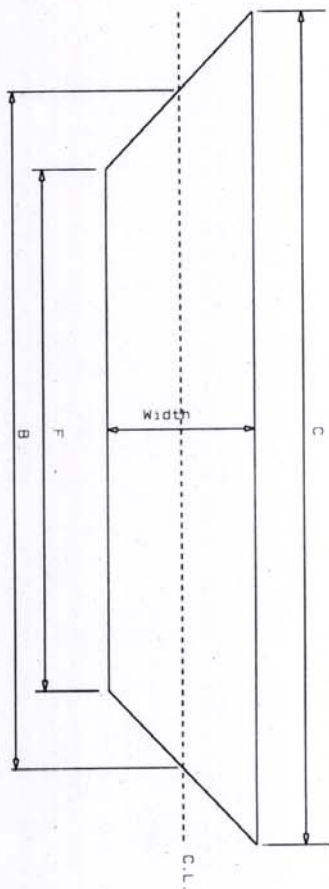
HEV

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SIZE A3

6140000494E

DRG. NO.



Item	Width	Thick	B	C	F	Weight
1A	520.0	402	3080.0	3600.0	2560.0	4777.6
2A	515.0	186	3080.0	3595.0	2565.0	2189.3
3A	505.0	258	3080.0	3585.0	2575.0	2977.8
4A	495.0	192	3080.0	3575.0	2585.0	2172.2
5A	485.0	132	3080.0	3565.0	2595.0	1463.2
6A	475.0	138	3080.0	3555.0	2605.0	1498.2
7A	460.0	180	3080.0	3540.0	2620.0	1892.4
8A	445.0	156	3080.0	3525.0	2635.0	1586.6
9A	430.0	138	3080.0	3510.0	2650.0	1356.2
10A	415.0	126	3080.0	3495.0	2665.0	1195.1
11A	400.0	90	3082.5	3482.5	2682.5	823.5
12A	380.0	132	3095.0	3475.0	2715.0	1152.0
Total						23084.0

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INVENTORY NO. SIGN AND DATE REF. DRG. NO.

DISTRIBUTION OF PRINTS
M.O. 63202A51201



BHARAT HEAVY ELEC. LTD

BHOPAL

REV. DATE
A. T. D. 10/10/94
C. K. 10/10/94

SCALE
N.T.S.

WEIGHT
DIN
CEN
KKA
SS/RS

NAME
SIGN
DATE
10/10/94

REF. TO ASSY. DRG.
IT NO.

NO. OF
VAR

TITLE

Main Leg Laminations

500MVA 400/220/33 KV OPTCL

DRAWING NO

34647000419

SHT NO. 5

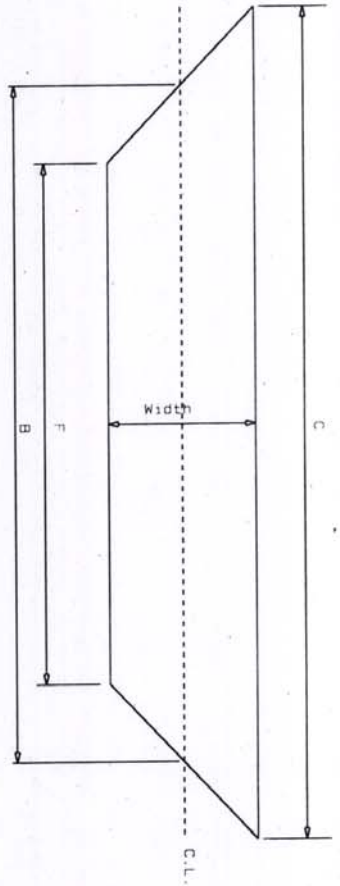
NO. OF SHTS. 17

REV
00

6170004794E

ON DRG

All dimensions in mm



Item	Width	Thick	B	C	F	Weight
1B	550.0	402	3050.0	3600.0	2500.0	5004.1
2B	545.0	186	3050.0	3595.0	2505.0	2294.3
3B	535.0	258	3050.0	3585.0	2515.0	3124.0
4B	525.0	192	3050.0	3575.0	2525.0	2281.4
5B	515.0	132	3050.0	3565.0	2535.0	1538.6
6B	505.0	138	3050.0	3555.0	2545.0	1577.3
7B	490.0	180	3050.0	3540.0	2560.0	1996.2
8B	475.0	156	3050.0	3525.0	2575.0	1677.1
9B	460.0	138	3050.0	3510.0	2590.0	1436.7
10B	445.0	126	3050.0	3495.0	2605.0	1265.0
11B	430.0	90	3052.5	3482.5	2622.5	876.6
12B	410.0	132	3065.0	3475.0	2655.0	1230.9
Total						24305.9

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INVENTORY NO SIGN AND DATE REF DRG NO

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BHARAT HEAVY ELEC. LTD

BHOPAL

REV	DATE	ALTERED	REMARKS

DEPT	INSTR. DESK	SCALE	WEIGHT

NAME	SIGN	DATE	NO OF

TITLE

Main Leg Laminations

500MVA 400/220/23 KV OPTCL

DRAWING NO

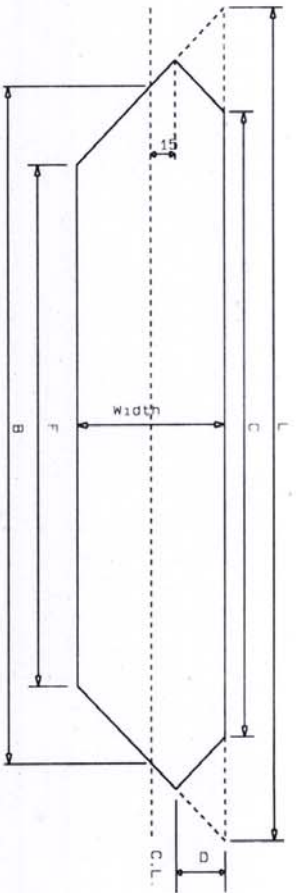
34647000419

SHT NO. 6 NO OF SHTS. 17

REV

00

SIZE A3



Item Width Thick	B	C	L	D	F	Wt-Punch	Wt-Cut
13 750.0	126	3445.0	2755.0	4195.0	360.0	2695.0	2173.4
14 710.0	108	3425.0	2775.0	4135.0	340.0	2715.0	1763.6
15 670.0	102	3385.0	2775.0	4055.0	320.0	2715.0	1561.6
16 630.0	90	3345.0	2775.0	3975.0	300.0	2715.0	1407.4
17 590.0	78	3305.0	2775.0	3895.0	280.0	2715.0	1037.9
18 540.0	96	3280.0	2800.0	3820.0	255.0	2740.0	1169.1
19 490.0	78	3255.0	2825.0	3745.0	230.0	2765.0	923.2
20 440.0	60	3240.0	2860.0	3680.0	205.0	2800.0	597.3
Total							10451.9

11436.8

INVENTORY NO. SIGN AND DATE REF DRG NO.

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BHARAT HEAVY ELEC. LTD
BHOPAL

REV. DATE
CHECKED
DATE

DEPT THE
DATE

SCALE
N.T.S.

WEIGHT

REF. TO ASSY DRG.

IT NO.

NO.

W.O.

TITLE

Main Leg Laminations

500MVA 400/220/33 KV. OPTCL

DRAWING NO

34647000419

REV

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DATE

DATE

SCALE

WEIGHT

REF. TO ASSY DRG.

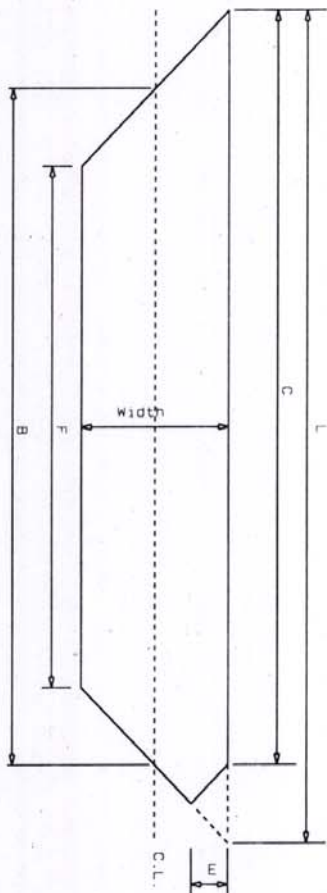
IT NO.

NO.

First Angle Projection

ON DRG

All dimensions in mm



Item	Width	Thick	B	C	L	E	F	Wt-Pinch	Wt-Cut
61	595.0	134	2135.0	2610.0	2730.0	60.0	1540.0	1259.6	1263.1
62	590.0	62	2140.0	2610.0	2730.0	60.0	1550.0	579.2	580.9
63	580.0	66	2150.0	2610.0	2730.0	60.0	1570.0	793.5	795.8
64	570.0	64	2160.0	2610.0	2730.0	60.0	1590.0	583.0	584.7
65	560.0	44	2170.0	2610.0	2730.0	60.0	1610.0	395.6	396.8
66	550.0	46	2180.0	2610.0	2730.0	60.0	1630.0	408.0	409.3
67	535.0	60	2195.0	2610.0	2730.0	60.0	1660.0	521.2	522.8
68	520.0	52	2210.0	2610.0	2730.0	60.0	1690.0	442.0	443.4
69	505.0	46	2225.0	2610.0	2730.0	60.0	1720.0	382.3	383.5
70	490.0	42	2240.0	2610.0	2730.0	60.0	1750.0	341.0	342.1
71	475.0	30	2255.0	2610.0	2730.0	60.0	1780.0	237.6	238.4
72	465.0	44	2275.0	2610.0	2730.0	60.0	1820.0	336.8	338.0
73	435.0	42	2295.0	2610.0	2730.0	60.0	1860.0	310.0	311.1
74	415.0	36	2315.0	2610.0	2730.0	60.0	1900.0	255.7	256.6
75	395.0	34	2335.0	2610.0	2730.0	60.0	1940.0	231.8	232.7
76	375.0	30	2355.0	2610.0	2730.0	60.0	1980.0	195.8	196.6
77	355.0	26	2375.0	2610.0	2730.0	60.0	2020.0	162.0	162.7
78	330.0	32	2400.0	2610.0	2730.0	60.0	2070.0	187.2	188.1

DISTRIBUTION OF PRINTS

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REV.	DATE	ALTERED	CHECKED
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NAME	SIGN	DATE	NO OF VAR
PP		26/11/24	
KKA		26/11/24	
SS/Kes		26/11/24	

REF. TO ASSY DRG

17 NO

TITLE

Main Yoke Laminations

500MVA 400/220/33 KV OPTCL

DRAWING NO

34647000419

REV

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SHT NO. B

NO OF SHTS

17

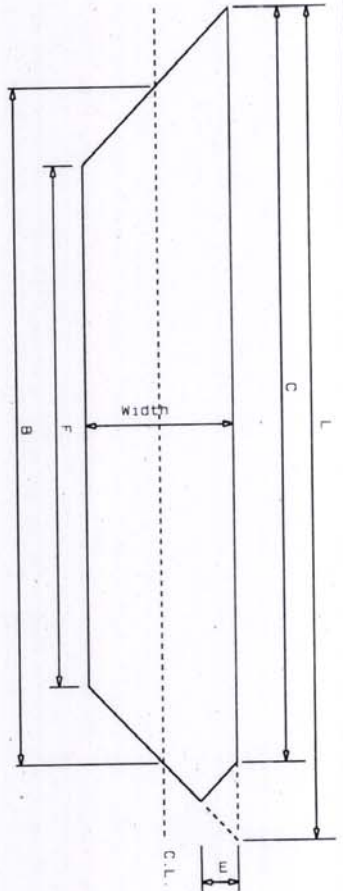
SIZE A3

First Angle Projection

614000494E

ON DRG

All dimensions in mm



Item	Width	Thick	B	C	L	E	F	Wt-Pnch	Wt-Cut
79	305.0	26	2425.0	2610.0	2730.0	60.0	2120.0	142.0	142.7
80	280.0	20	2450.0	2610.0	2730.0	60.0	2170.0	101.3	101.8
Total									7865.7 7891.2

INVENTORY NO. SIGN AND DATE REF DRG NO.

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M.O. 63202A51201

REV	DATE	ALTERED	CHECKED
1			



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BHOPAL



SCALE N.T.S.

WEIGHT

REF TO ASSY DRG.

IT NO

NO

TITLE

Main Yoke Laminations

500MVA 400/220/33 KV OPTCL

DRAWING NO

34647000419

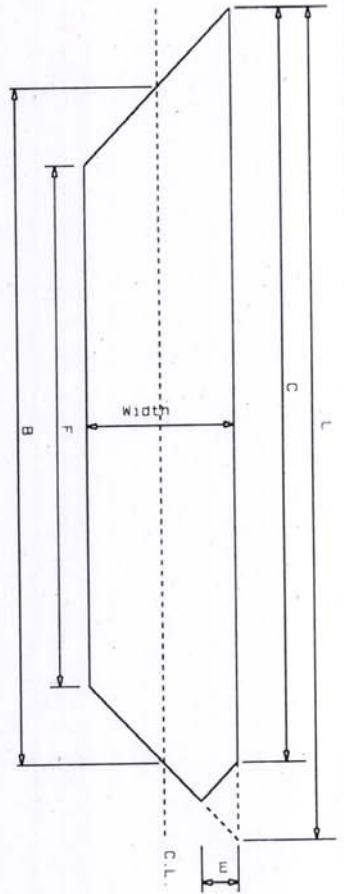
SHT NO: 9

NO OF SHTS 17

REV

00

SIZE A3



Item	Width	Thick	B	C	L	E	F	Wt-Pnch	Wt-Cut
81	595.0	134	2135.0	2610.0	2730.0	60.0	1540.0	1259.6	1263.1
82	590.0	62	2140.0	2610.0	2730.0	60.0	1550.0	579.2	580.9
83	580.0	66	2150.0	2610.0	2730.0	60.0	1570.0	793.5	795.8
84	570.0	64	2160.0	2610.0	2730.0	60.0	1590.0	583.0	584.7
85	560.0	44	2170.0	2610.0	2730.0	60.0	1610.0	395.6	396.8
86	550.0	46	2180.0	2610.0	2730.0	60.0	1630.0	408.0	409.3
87	535.0	60	2195.0	2610.0	2730.0	60.0	1660.0	521.2	522.8
88	520.0	52	2210.0	2610.0	2730.0	60.0	1690.0	442.0	443.4
89	505.0	46	2225.0	2610.0	2730.0	60.0	1720.0	382.3	383.5
90	490.0	42	2240.0	2610.0	2730.0	60.0	1750.0	341.0	342.1
91	475.0	30	2255.0	2610.0	2730.0	60.0	1780.0	237.6	238.4
92	455.0	44	2275.0	2610.0	2730.0	60.0	1820.0	336.8	338.0
93	435.0	42	2295.0	2610.0	2730.0	60.0	1860.0	310.0	311.1
94	415.0	36	2315.0	2610.0	2730.0	60.0	1900.0	255.7	256.6
95	395.0	34	2335.0	2610.0	2730.0	60.0	1940.0	231.8	232.7
96	375.0	30	2355.0	2610.0	2730.0	60.0	1980.0	195.8	196.6
97	355.0	26	2375.0	2610.0	2730.0	60.0	2020.0	162.0	162.7
98	330.0	32	2400.0	2610.0	2730.0	60.0	2070.0	197.2	198.1

DISTRIBUTION OF PRINTS

W.O. 63202A51201



BHARAT HEAVY ELEC. LTD.

BHO PAL

REV	DATE	ALTERED	CHECKED	DATE

DEPT	THE	UNCL. DWS. GR.

SCALE	N.T.S.

WEIGHT

NAME	SIGN	DATE

NO. OF	VAR

ZONE

TITLE

Main Yoke Laminations

DRAWING NO

REV

500MVA 400/220/33 KV. OPTCL

34647000419

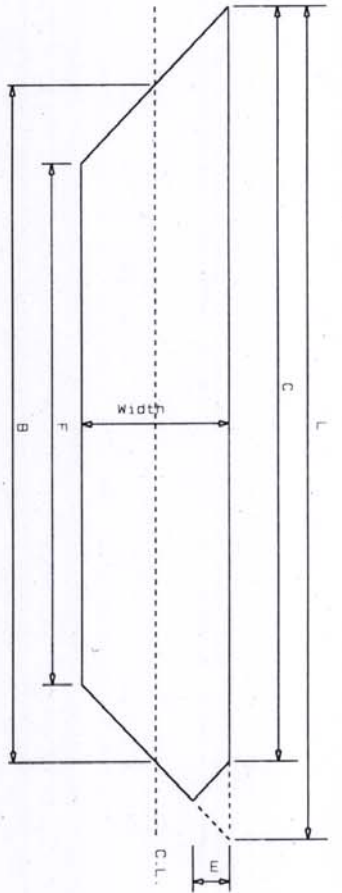
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First Angle Projection

6147000419

DN DRG

All dimensions in mm



Item	Width	Thick	B	C	L	E	F	Wt-Pnch	Wt-Cut
99	305.0	26	2425.0	2610.0	2730.0	60.0	2120.0	142.0	142.7
100	280.0	20	2450.0	2610.0	2730.0	60.0	2170.0	101.3	101.8
Total									7865.7 7891.2

INVENTORY NO.	SIGN AND DATE	REF DRG NO.
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M.O: 63202A51201

REV.	DATE	ALTERED	CHECKED	APPROVED

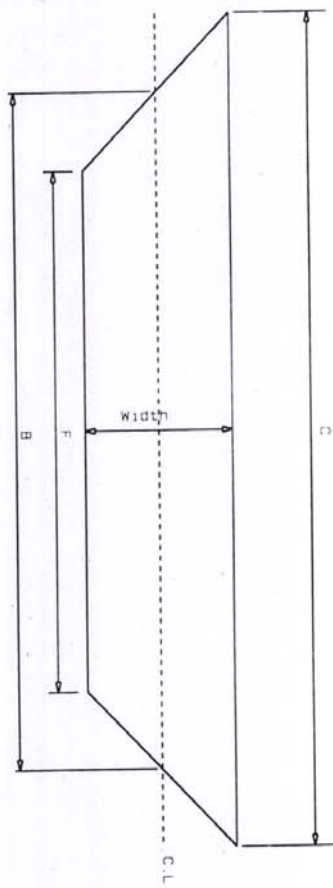
		BHARAT HEAVY ELEC. LTD.	
Bhopal			
DEPT.	THE	SCALE	WEIGHT
		N.T.S.	
DRG	PP	DATE	NO. OF
APPR	SS/RS	5/1/13	VAR
REF. TO ASSY. DRG		17 NO	

TITLE		DRAWING NO		REV	
Main Yoke Laminations		34647000419		00	
500MVA 400/220/33 KV. OPTCL		SHT NO: 11		NO OF SHTS. 17	

SIZE A3

614000494C

DN 590



119 305.0 26 2425.0 2730.0 2120.0 142.7
 120 280.0 20 2450.0 2730.0 2170.0 101.8
 Total 7891.2

It Width Thick B C F Wt-Cut

101	595.0	134	2135.0	2730.0	1540.0	1263.1
102	590.0	62	2140.0	2730.0	1550.0	580.9
103	580.0	86	2150.0	2730.0	1570.0	795.8
104	570.0	64	2160.0	2730.0	1590.0	584.7
105	560.0	44	2170.0	2730.0	1610.0	396.8
106	550.0	46	2180.0	2730.0	1630.0	409.3
107	535.0	60	2195.0	2730.0	1660.0	522.8
108	520.0	52	2210.0	2730.0	1690.0	443.4
109	505.0	46	2225.0	2730.0	1720.0	383.5
110	490.0	42	2240.0	2730.0	1750.0	342.1
111	475.0	30	2255.0	2730.0	1780.0	238.4
112	455.0	44	2275.0	2730.0	1820.0	338.0
113	435.0	42	2295.0	2730.0	1860.0	311.1
114	415.0	36	2315.0	2730.0	1900.0	256.6
115	395.0	34	2335.0	2730.0	1940.0	232.7
116	375.0	30	2355.0	2730.0	1980.0	196.6
117	355.0	26	2375.0	2730.0	2020.0	162.7
118	330.0	32	2400.0	2730.0	2070.0	188.1

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INVENTORY NO. SIGN AND DATE REF DRG NO.

M.O. 63202A51201

DISTRIBUTION OF PRINTS



BHARAT HEAVY ELEC. LTD

BHOPAL

DEPT THE

UNITO. DIVS. PH

SCALE

N.T.S

WEIGHT

N.T.S

N.T.S

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N.T.S

TITLE

Main Yoke Laminations

500MVA 400/220/33 KV OPTCL

DRAWING NO

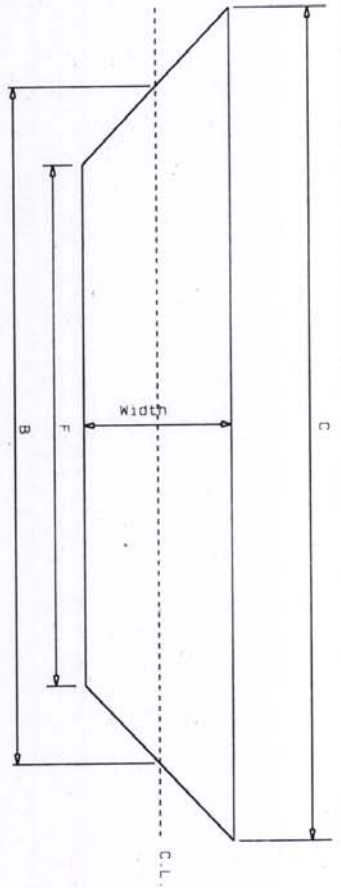
34647000419

SHT NO. 12

NO OF SHTS. 17

REV

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139 305.0 26 2425.0 2730.0 2120.0 142.7
140 280.0 20 2450.0 2730.0 2170.0 101.8

Total 7891.2

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must not be used directly or indirectly in any way detrimental to the interest of the company.

INVENTORY NO. SIGN AND DATE REF DRG NO.

It	Width	Thick	B	C	F	Mt-Cut
121	595.0	134	2135.0	2730.0	1540.0	1263.1
122	590.0	52	2140.0	2730.0	1550.0	580.9
123	580.0	86	2150.0	2730.0	1570.0	795.8
124	570.0	64	2160.0	2730.0	1590.0	584.7
125	560.0	44	2170.0	2730.0	1610.0	396.8
126	550.0	46	2180.0	2730.0	1630.0	409.3
127	535.0	60	2195.0	2730.0	1660.0	522.8
128	520.0	52	2210.0	2730.0	1690.0	443.4
129	505.0	46	2225.0	2730.0	1720.0	383.5
130	490.0	42	2240.0	2730.0	1750.0	342.1
131	475.0	30	2255.0	2730.0	1780.0	238.4
132	455.0	44	2275.0	2730.0	1820.0	338.0
133	435.0	42	2295.0	2730.0	1860.0	311.1
134	415.0	36	2315.0	2730.0	1900.0	256.6
135	395.0	34	2335.0	2730.0	1940.0	232.7
136	375.0	30	2355.0	2730.0	1980.0	196.6
137	355.0	26	2375.0	2730.0	2020.0	162.7
138	330.0	32	2400.0	2730.0	2070.0	188.1

DISTRIBUTION OF PRINTS

M.O. 63202A51201



BHARAT HEAVY ELEC. LTD.

BHOPAL

REV	DATE	ALTERED	CHECKED	APPROVED
1/06				

DEPT	UNIT	DRG. GR.
TRF		

SCALE	WEIGHT
N T S	

DRN	NAME	SIGN	DATE	NO. OF
CCO	KKA		5/11/23	VAR
APPD	SS/BS		19/1/24	
REF. TO ASSY. DRG.			IT NO.	NO.

TITLE

Main Yoke Laminations

500MVA 400/220/23 KV. OPTCL

DRAWING NO

34647000419

REV

00

Sheet NO: 13

NO. OF SHEETS: 17

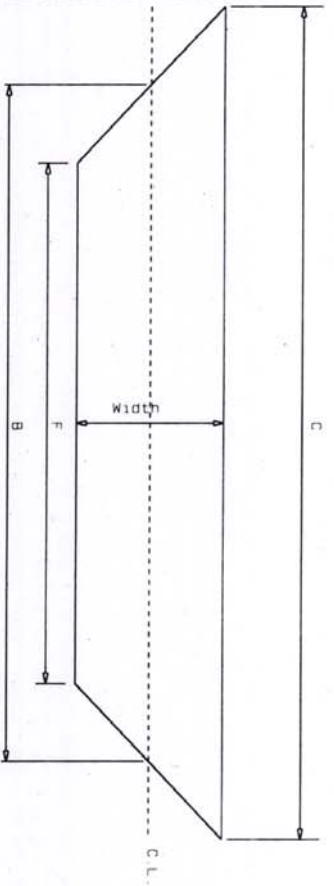
SIZE A3

First Angle Projection

61P0004794E

DN 000

All dimensions in mm



159 185.0 104 1455.0 1640.0 1270.0 207.7
160 160.0 80 1467.5 1627.5 1307.5 139.4
Total 14627.9

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It	Width	Thick	B	C	F	Wt-Cut
141	475.0	536	1310.0	1785.0	835.0	2474.9
142	470.0	248	1312.5	1782.5	842.5	1135.2
143	460.0	344	1317.5	1777.5	857.5	1547.0
144	450.0	256	1322.5	1772.5	872.5	1130.5
145	440.0	176	1327.5	1767.5	887.5	762.8
146	430.0	184	1332.5	1762.5	902.5	782.3
147	415.0	240	1340.0	1755.0	925.0	990.4
148	400.0	208	1347.5	1747.5	947.5	831.9
149	385.0	184	1355.0	1740.0	970.0	712.3
150	370.0	168	1362.5	1732.5	992.5	628.5
151	355.0	120	1370.0	1725.0	1015.0	433.1
152	335.0	176	1380.0	1715.0	1045.0	603.8
153	315.0	168	1390.0	1705.0	1075.0	545.8
154	295.0	144	1400.0	1695.0	1105.0	441.3
155	275.0	136	1410.0	1685.0	1135.0	391.3
156	255.0	120	1420.0	1675.0	1165.0	322.4
157	235.0	104	1430.0	1665.0	1195.0	259.3
158	210.0	128	1442.5	1652.5	1232.5	287.7

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W.O: 63202A51201



BHARAT HEAVY ELEC. LTD

BHOPAL



SCALE 1:1

WEIGHT

REF TO ASSY DRG

NO OF VARS

TITLE

Aux Yoke Laminations
500MVA 400/220/33 KV OPTCL

DRAWING NO

34647000419

REV

00

SHT NO: 14

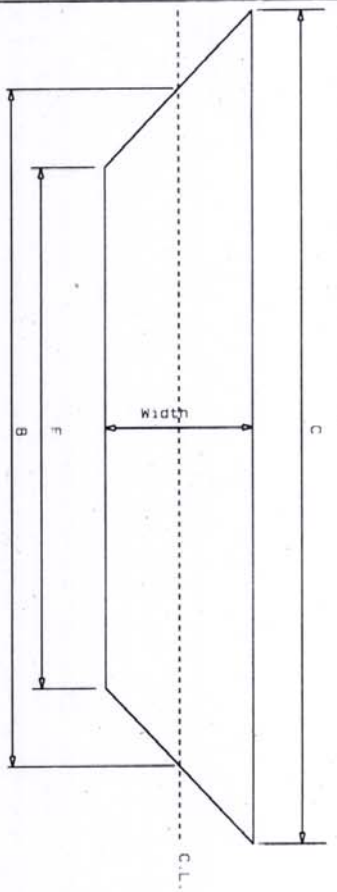
NO OF SHTS

L7

SIZE A3

6140004794C

ON DRG



Item	Width	Thick	B	C	F	Weight
59	185.0	26	3010.0	3195.0	2825.0	107.4
60	150.0	20	3020.0	3180.0	2860.0	71.7
Total						8255.1

Item Width Thick B C F Weight

41	475.0	134	3035.0	3510.0	2560.0	1433.5
42	470.0	62	3035.0	3505.0	2565.0	656.3
43	460.0	86	3035.0	3485.0	2575.0	890.9
44	450.0	64	3035.0	3485.0	2585.0	648.6
45	440.0	44	3035.0	3475.0	2595.0	436.0
46	430.0	46	3035.0	3465.0	2605.0	445.5
47	415.0	60	3035.0	3450.0	2620.0	560.8
48	400.0	52	3035.0	3435.0	2635.0	468.4
49	385.0	46	3035.0	3420.0	2650.0	398.9
50	370.0	42	3035.0	3405.0	2665.0	350.0
51	355.0	30	3037.5	3392.5	2682.5	240.0
52	335.0	44	3050.0	3385.0	2715.0	333.6
53	315.0	42	3070.0	3385.0	2755.0	301.4
54	295.0	36	3070.0	3365.0	2775.0	241.9
55	275.0	34	3050.0	3325.0	2775.0	211.6
56	255.0	30	3030.0	3285.0	2775.0	172.0
57	235.0	26	3010.0	3245.0	2775.0	136.5
58	210.0	32	3010.0	3220.0	2800.0	150.1

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SIGN AND DATE

REF DRG NO

INVENTORY AC

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REV.	DATE	ALTERED	CHECKED	DATE
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BHARAT HEAVY ELEC. LTD.

BHOVAL

SCALE
N.T.S.

WEIGHT

REF. TO ASSY. DRG

IT NO

NO

NAME

SIGN

DATE

NO OF

VARS

DIN

DIN

DIN

DIN

DIN

DIN

DIN

DIN

DIN

TITLE

Aux Leg Laminations

500MVA 400/220/33 KV. OPTCL

DRAWING NO

34647000419

SHT NO 15

NO OF SHTS 17

REV

00

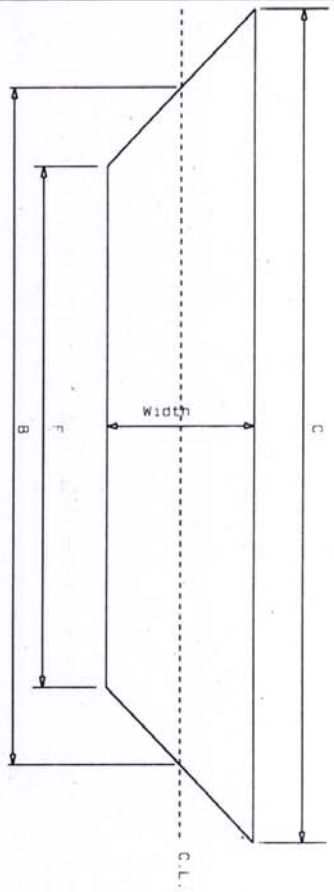
SIZE A3

First Angle Projection

61P0002494E

ON DRG

All dimensions in mm



Item	Width	Thick	B	C	F	Weight
39	185.0	26	2950.0	3135.0	2765.0	105.3
40	160.0	20	2960.0	3120.0	2800.0	70.3
Total						8092.0

Item	Width	Thick	B	C	F	Weight
21	475.0	134	2975.0	3450.0	2500.0	1405.1
22	470.0	62	2975.0	3445.0	2505.0	543.3
23	460.0	56	2975.0	3435.0	2515.0	873.3
24	450.0	64	2975.0	3425.0	2525.0	635.8
25	440.0	44	2975.0	3415.0	2535.0	427.4
26	430.0	46	2975.0	3405.0	2545.0	436.7
27	415.0	60	2975.0	3390.0	2560.0	549.7
28	400.0	52	2975.0	3375.0	2575.0	459.2
29	385.0	46	2975.0	3360.0	2590.0	391.0
30	370.0	42	2975.0	3345.0	2605.0	343.1
31	355.0	30	2977.5	3332.5	2622.5	235.3
32	335.0	44	2890.0	3325.0	2655.0	327.0
33	315.0	42	3010.0	3325.0	2695.0	295.5
34	295.0	36	3010.0	3305.0	2715.0	237.2
35	275.0	34	2990.0	3265.0	2715.0	207.5
36	255.0	30	2870.0	3225.0	2715.0	168.6
37	235.0	26	2950.0	3185.0	2715.0	133.8
38	210.0	32	2950.0	3160.0	2740.0	147.1

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M.O: 63202A51201



BHARAT HEAVY ELEC. LTD

BHOPAL

SCALE
N.T.S.

WEIGHT

REF TO ASSY DRG

IT NO

NO

NAME

SIGN

DATE

NO OF

DRN

PP

KKA

SS/RS

10/1/24

10/1/24

NO

REV

DATE

CHECKED

DATE

CODE

ZONE

DEPT

THE

INTL. DIMS. DR.

SCALE

N.T.S.

WEIGHT

REF TO ASSY DRG

IT NO

NO

DRAWING NO

34647000419

SMT NO

16

NO OF SMTS

LT

REV

00

SIZE A3

First Angle Projection

6140002494C DN DRG

All dimensions in mm

NO.	Width	SLIT-WT	S-LEN (M)	NO.	Width	SLIT-WT	S-LEN (M)	NO.	Width	SLIT-WT	S-LEN (M)	NO.	Width	SLIT-WT	S-LEN (M)
1	160.0	281.4	999.5	2	185.0	420.5	1291.7	3	210.0	584.9	1583.0	4	235.0	529.6	1280.7
5	255.0	663.0	1477.8	6	275.0	810.4	1674.8	7	280.0	407.2	826.6	8	295.0	920.5	1773.3
9	305.0	570.8	1063.6	10	315.0	1142.7	2061.8	11	330.0	752.3	1295.6	12	335.0	1264.4	2145.1
13	355.0	1559.1	2496.1	14	370.0	1321.5	2029.9	15	375.0	786.4	1191.8	16	380.0	1152.0	1723.0
17	385.0	1502.1	2217.4	18	395.0	930.8	1339.3	19	400.0	2583.0	3670.1	20	410.0	1230.9	1706.3
21	415.0	4322.5	5919.7	22	430.0	3897.3	5151.1	23	435.0	1244.6	1626.1	24	440.0	2261.0	2920.5
25	445.0	2855.6	3647.1	26	450.0	2414.9	3050.0	27	455.0	1351.9	1688.6	28	460.0	6640.4	8204.4
29	470.0	2434.8	2944.2	30	475.0	9442.6	11298.1	31	485.0	1463.2	1714.6	32	490.0	4287.7	4973.2
33	485.0	2172.2	2494.0	34	505.0	6089.2	6853.0	35	515.0	3727.9	4114.0	36	520.0	6551.4	7160.5
37	525.0	2281.4	2469.7	38	535.0	5215.3	5540.4	39	540.0	1261.7	1328.0	40	545.0	2294.3	2392.5
41	550.0	6641.1	6862.6	42	560.0	1587.1	1610.7	43	570.0	2338.6	2332.0	44	580.0	3183.2	3119.2
45	590.0	3452.2	3325.5	46	595.0	5052.6	4826.2	47	630.0	1407.4	1269.6	48	670.0	1716.6	1456.1
49	710.0	1948.8	1560.0	50	750.0	2415.8	1830.6								



Total Sittling Weight = 121366.6 KG
 Nett Core Weight = 120330.6 KG
 Core steel to be drawn = 124400.8 KG
 (With 2.5 % wastage)

INVENTORY NO.	SIGN AND DATE	REF DRG NO.
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DISTRIBUTION OF PRINTS		BHARAT HEAVY ELEC. LTD		BHOPAL		SCALE		WEIGHT		NAME		SIGN		DATE		NO. OF	
REV.	DATE	ALTRD	CHECKED	DEPT	TRE	INTL. DRWG. DR.	N.T.S			APPRO	REF. TO ASSY. DRG.					NO.	VAR
W.O. 63202A51201																	
TITLE Summary of weights 500MVA 400/220/33 KV. OPTCL										DRAWING NO		34647000419		REV		00	
ZONE										SHT NO.		17		NO. OF SHTS.		17	

SL. NO.		ITEM / TEST / OPERATION		SUPPLIER DETAILS:			STANDARD MANUFACTURING QUALITY PLAN			CUSTOMER ADDRESS:		
				EHV TRANSFORMERS AND SHUNT REACTORS (UP TO 400 KV)			OPTCL CORPORATE OFFICE,JANPATH, BHOINAGAR,BHUBANESWAR, ODISHA, PIN-751022					
				DATE OF ISSUE :- 25.06.2021			QAP NO. :- OPTCL/EQ/MQP/EHVTRF-RTR					
TYPE OF CHECK		SAMPLING RATE		REFERENCE DOCUMENT		ACCEPTANCE NORMS			RECORD FORMATS		RESPONSIBILITY	
											S M C	

1.10.11	LACQUER QUOTED TAPE(IF APPLICABLE)	MANUFACTURER SHALL FURNISH ALL DETAILS FOR APPROVAL FROM OPTCL DURING DESIGN REVIEW .												CM-TC	P	W	W/V
1.11	CRGO STEEL (Parent material)(Witness of mother coil sampling for NABL test, witness of slitting ,cutting & Packing at processor work weather in house or Third party.																
1.11.1	Check the following document: 1.Manufacturer's identification slip/ unique numbering of prime CRGO coil 2.Invoice of supplier 3.Mill's Test certificate 4.Packing List 5. Bill of Lading. 6.Bill of Entry	VI	100% of coils	As per OS/EM-MS										EM-TC/CM-TC	P	P/V	V
		MM	10% of coils (random selection)											EM-TC/CM-TC	P	P/V	W
		EL	One sample per lot											EM-TC	P	P/V	W
		ME	- DO -											EM-TC	P	P/V	W
		EL	- DO -											EM-TC	P	P/V	W
1.11.2	Check for coil grade, width & thickness from name plate	MM												EM-TC/CM-TC	P	P/V	W
1.11.3	Specific Core Loss before and after aging test	EL	One sample per lot											EM-TC	P	P/V	W
1.11.4	Stacking Factor	ME	- DO -											EM-TC	P	P/V	W
1.11.5	Surface Insulation Resistivity	EL	- DO -											EM-TC	P	P/V	W
1.11.6	Minimum Magnetic Polarisation at fieldstrength of 800 AT/m & 50 Hz	EL	- DO -	IS 3024 / IS 649 / IEC 60404/ As per OS,AD & MS										EM-TC	P	P/V	W
1.11.7	Accelerated ageing test	EL	- DO -											EM-TC	P	P/V	W
1.11.8	Ductility/ Bend test	ME	- DO -											EM-TC	P	P/V	W
1.11.9	Chemical Composition	CH	SS											AL-TC	---	---	V
1.11.10	CORE CHEESE(PACKETS)	APPLICABLE ONLY FOR SHUNT REACTORS															
1.11.10.1	Visual Check	VI	100%											EM-TC	P	P/V	V
1.11.10.2	Surface flatness Check	ME	10% sample (Random Selection)	IS 3024 / IS 649 / IEC 60404/ As per OS,AD & MS										EM-TC	P	P/V	V
1.11.10.3	Placement of Ceramic Spacers	VI	- DO -											EM-TC	P	P/V	V
1.11.10.4	Total Height and Diameter	MM	One Sample Per Lot											EM-TC	P	P/V	V
1.12	NITRILE GASKET FOR TRANSFORMER(RECORD REVIEW)																
1.12.1	Visual Check	VI	Lot Sample 2 to 90 3 91 to 280 13	ISO 7619-1 / ISO 815 / ISO 37 / ISO 3865 / ISO 11149 / BS 2751 / As per OS,AD & MS										CM-TC	P	P/W	
1.12.2	Dimension check	MM	- DO -	Free from cracks & pinholes										CM-TC	P	P/W	V
1.12.3	Shore Hardness Check	ME	One sample per size per lot	Dimension within tolerance.										CM-TC	P	W	V
				70 (±5) IRHD										CM-TC	P		
				CHECKED 													
				APPROVED 													

SL. NO.		ITEM / TEST / OPERATION		SUPPLIER DETAILS:			STANDARD MANUFACTURING QUALITY PLAN			CUSTOMER ADDRESS:		
				EHV TRANSFORMERS AND SHUNT REACTORS (UP TO 400 KV)			OPTCL CORPORATE OFFICE,JANPATH,					
				DATE OF ISSUE :- 25.06.2021			REV. :- 00			QAP NO. :- OPTCL/EQ/MQP/EHVTRF-RTR		
BHOINAGAR, BHUBANESWAR, ODISHA, PIN-751022		REFERENCE DOCUMENT		ACCEPTANCE NORMS		RECORD FORMATS		RESPONSIBILITY				
		TYPE OF CHECK		SAMPLING RATE				S		M C		

2.1.1.14	Check arrangement of Fibre Optic Sensor (FOS) (if applicable)	VI	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.2	COIL STABILISATION								
2.1.2.1	Drying of coils i)Oven Temperature ii)Stabilising pressure	VE	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.2.2	Coil clamping for shrinking and shrunk coil height and dimension and shrinking force	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.2.3	Visual Inspection	VI	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.2.4	Testing of winding: Continuity/buzzer test	VE	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.3	COIL ASSEMBLY								
2.1.3.1	Coil Height and Dimension	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.3.2	End ring Dimensions	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.3.3	Placement of coils	VI	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.3.4	Clearance between coil and inter coil insulation	VE	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.3.5	Top insulation	VE	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.3.6	Lead forming and dimension	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	V
2.1.3.7	a) Winding Conductor sample selection for Purity analysis and Oxygen content.(If desired by the Purchaser) b) Winding conductor sample collection for check of DP before and after VP.	SS	100%	As per OS / SMQP	As per OS / SMQP	AL-TC	---	---	V
2.2	CRGO LAMINATION FOR CORE (TEST WITNESS AT THE TIME OF MOTHER COIL SAMPLING,CUTTING,SLITTING AS PER CL.1.11)								
2.2.1	Traceability Record of parent coil	VE	One sample of each type per item	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.2.2	Slitting dimension	MM	-DO -	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.2.3	Check of thickness and dimensions	MM	-DO -	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.2.4	Burr check	MM	-DO -	As per OS/AD/DD/EM-MS	20 micron (Max)	EM-TC	---	P	W
2.2.5	Edge Bow Check	MM	-DO -	As per OS/AD/DD/EM-MS	Bow : L<250 mm H<2 mm L<250 mm H<3 mm Others as per EM SPEC/ Specific Grade	EM-TC	---	P	W
2.2.6	Edge Camber Check	VI	-DO -	As per OS/AD/DD/EM-MS	Max. 0.9 mm for length of 2 meter.	EM-TC	---	P	W

SUPPLIER DETAILS:		STANDARD MANUFACTURING QUALITY PLAN				CUSTOMER ADDRESS:			
EHV TRANSFORMERS AND SHUNT REACTORS (UP TO 400 KV)						OPTCL CORPORATE OFFICE,JANPATH, BHOINAGAR,BHUBANESWAR, ODISHA, PIN-751022			
DATE OF ISSUE :- 25.06.2021		REV. :- 00		QAP NO. :- OPTCL/EQ/MQP/EHVTRF-RTR					
SL. NO.	ITEM / TEST / OPERATION	TYPE OF CHECK	SAMPLING RATE	REFERENCE DOCUMENT	ACCEPTANCE NORMS	RECORD FORMATS	RESPONSIBILITY		
							S	M	C

2.2.7	Wave Factor	VI	-DO -	As per OS/AD/DD/EM-MS	Less than 1.5%	EM-TC	---	P	W
2.3	CORE BUILDING & FRAME ASSEMBLY								
2.3.1	CRGO sheet selection during core building for testing of a) Specific core loss b) Stacking factor c) Surface insulation resistivity d) Magnetic polarisation e) Ductility / Bend test f) Ageing g) Lamination thickness	SS	One sample/transformer	As per OS/SMQP	AT THE TIME OF CORE CUTTING AND SLITTING	EM-TC	---	P	W
2.3.2	Chemical Composition check (If desired by the Purchaser)	SS	One sample/transformer	As per OS/SMQP	As per OS/SMQP	AL-TC	---	---	V
2.3.3	Check of frame assembly	VI	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.4	Check of Core Diameter	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.5	Leg Center and Leg Length	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.6	Check window width and window height and diagonal of frame	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.7	Check height of core stack	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.8	Check for rectangularity of core assembly	VI	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.9	Limb clamping and binding	VE	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.10	Check for overlaps and air gaps at joints	VE	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.11	Check arrangement of insulation for limb and plates	VI	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.12	Check assembly of tensile bolt/yoke bolt (torque check)	VI	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.13	Check banding of polyester tape	VE	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.14	Check of core inclination	VI	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.15	Check of waviness of core yoke	VI	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.16	Check of Overall Dimension of core (without Top Yoke)	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.17	Core assembly dielectric and earthing continuity test (Check of insulation resistance between (CC-CI, CC-Yoke Bolt, CI-Yoke Bolt)-by 2kV/EL IR Tester	MM	100%	As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.3.18	Check insulation resistance between cooling duct by 500 V megger(HEL Applicable)	-DO -		As per OS/AD/DD/EM-MS	As per OS/AD/DD/EM-MS	EM-TC	---	P	W
2.4	CORE & COIL ASSEMBLY								