

**ANDREW YULE AND COMPANY LIMITED  
(A GOVERNMENT OF INDIA ENTERPRISE)  
ELECTRICAL DIVISION  
SWITCHGEAR UNIT  
14 MAYURBHANJ ROAD  
KOLKATA 700023.**

TELEPHONE: 24491601  
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TENDER NO: Tender No. ED/SWG/TR/33/11/25/CCA dated 26/03/13

**Last Date of Sale of Tender Documents: 08/04/2013 upto 4 pm**

**Last Date of submission of Offer: 09/04/13 upto 4 pm**

**Techno-Commercial Bid of Tender will be opened on 10/04/2013  
at 11 am**

Cost of Tender documents: Rs. 200/- (Rupees Two Hundred Only)  
TENDER DOCUMENT IS AVAILABE FROM OUR OFFICE OR MAY BE DOWNLOADED FROM  
OUR WEBSITE: [www.andrewyule.com](http://www.andrewyule.com)  
COST OF TENDER TO BE SUBMITTED IN THE FORM OF DEMAND DRAFT IN CASE  
TENDER IS DOWNLOADED FROM WEBSITE.

### 1. **Description of Item**

- 1) Core assembly for 25KVA, 3 star 11/0.433KV 3 ph distribution transformer
- 2) Coil assembly for 25KVA, 3 star 11/0.433KV 3 ph distribution transformer
- 3) Core-Coil assembly for 25KVA, 3 star 11/0.433KV 3 ph distribution transformer

2. **Eligibility Criteria:** Only manufacturers of tendered items are to quote. Manufacturer has to submit full address of works with their valid registration with NSIC/SSI/DGS&D/Registrar of Companies in their own name to be submitted with their offer. All the above items are to be supplied as per AYCL drawing & design. Those vendors, who are associated with AYCL for development of aforesaid items, may also be considered to quote.

### 3. **Method & Mode of Submission :**

Two Bid System – Part – I & Part - II

➤ **Part – I: Techno Commercial Bid:** This part of offer should contain the documents & details asked for as under: **[In no case should contain / indicate the offered prices]**

(a) Confirmation of our Technical Specification ,GTP.

(b) Confirmation of all Commercial Terms & Conditions as specified under Tender Condition (a) to (j) below.

(c) Specify VAT registration no.

(d) Documentation, including Testing Facilities available.

(e) Credentials of the vendor

(f) EMD

➤ **Part – II: Price Bid:** This part of the offer should contain only price portion. Discount if any, applicable (on basic price / landed price etc), should be clearly spelt out both in figures and words. However, no conditional discount will be considered for the purpose of evaluation of the offer.

➤ Part – “I” (Techno Commercial Bid) will be opened in specified date and time as given in the covering page, in presence of the attending tenderers or their authorized representatives.

➤ Part – “II” (Price Bid) will be opened only of those tenders whose Part “I” is found to be techno commercially acceptable. Such tenderers will be intimated to attend the opening. Separate price to be indicated for Core grade 23ZDMH85 & grade M4. Item wise separate price to be quoted for 1) Core Assembly 2) Coil Assembly 3) Core-coil Assembly. Also note that separate Price to be quoted for a quantity of 5000 nos of each item, 10000nos of each item & 20000nos of each item on **annual rate contract basis**. Detailed break up of material cost to be provided. AYCL reserves the right to extend the rate contract for another one year also.

**NOTE:** For proper identification both PART – “I” and PART – “II” should be kept in separate sealed envelopes and clearly be marked on top of the envelop as mentioned above i.e. PART “I” - TECHNO COMMERCIAL BID and PART “II” – PRICE BID. Both these envelopes should again be kept in a third sealed envelope). All the envelopes must be sealed and the Tender no and Due date of opening must be super scribed thereupon.

### 4. **Tender Condition:**

(a) **EMD:** The value of Earnest Money to be deposited by the tenderer should be Rs. 200000/- (Rupees Two Lacs only). Earnest Money Deposit (EMD) should be in the form of Demand Draft drawn in favour of “ Andrew Yule & Company Limited” payable at Kolkata and must be accompanied with the quotation i.e. PART – I of the bid. For unsuccessful tenderer, EMD shall be refunded immediately after finalization of the

tender. EMD shall be forfeited if any tenderer withdraw their offer before finalization of the tender. Or fails to submit order acceptance within 15 days from the date of order. If any vendor has any dues from AYCL – Switchgear Unit Kolkata, EMD may be adjusted against such dues on the basis of specific request of the vendor in written in this regard.

Besides who are MSMED units may apply for exemption from furnishing EMD / BG in lieu of EMD by making necessary documents in support of the same.

- (b) **Performance Bank Guarantee:** 10% of the value of contract shall be furnished as Performance Bank Guarantee valid till the guarantee period.
- (c) **Guarantee / Warranty:** the tenderers shall give a warranty of satisfactory performance for the unit offered by them for a period of 42 months from the date of receipt and acceptance of material.
- (d) **Terms of Payment:** 90 days direct credit.
- (e) **Inspection / Testing:** Initial inspection to be done at manufacturer's works at different stages of production. Final inspection will be done at our works. Please conform acceptance. Final Inspection/Test parameters to be achieved.
- (f) **Liquidated Damage:** If the delivery is delayed beyond the date of schedule date of dispatch in the purchase order, penalty will be levied @ ½% per week subject to a maximum of 5%. Please confirm acceptance.
- (g) **Risk Purchase Clause:** The Company reserves the right to impose Risk Purchase clause as for delay in execution / supply, we shall have every right to do the same from other agency/s which shall deemed fit and the additional cost of the same (Incidental / consequential) shall be to your account which with respect to our intimation or observation whatsoever. Please confirm acceptance.
- (h) **Legal condition:** All disputes relating to this offer or relating to the price of the goods supplied hereunder or otherwise arising between the seller and buyer shall be subject to and referred to the court or competent jurisdiction situated within the limits of the city of Kolkata neither the seller nor the buyer shall take or adopt any legal proceedings to enforce any claim against the order relating to this order or arising there from in any court other than the court of competent jurisdiction within the limits of the city of Kolkata.
- (i) **Price Basis:** Price [FOR AYCL Kolkata],
- (j) **Cost of Tender:** Tenderers, who will procure the document in cash, they have to submit the money receipt with techno commercial bid otherwise the tenderers have to submit the demand draft of Rs200/- (Drawn in favour of ANDREW YULE & CO LTD) with techno commercial bid.

#### **NOTE**

(1) Proper loading in price shall be made by us for important terms i.e. payment terms, cost of delivery to the destination, Sales Tax / VAT, other taxes & duties etc. having financial implication.

(2) Offer sent through email fax and envelopes without super scribing the Tender Number with the due date will not be considered. The complete offer should be typed in the letterhead of the tenderers (Hand written quotations will be summarily rejected). Quotations, erased and overwritten shall be summarily rejected, unless authenticated with the tenderer's signature.

(3) AYCL also reserves the right for preference of procurement of core-coil assemblies in bulk quantities instead of separate procurement of core assly & coil assly. Confidential agreement will be made between AYCL & the selected vendor regarding minute details of AYCL drawing & design.

(4) Minute details of drawings will be handed over to the vendor in the event of P.O.

- (5) AYCL reserves the right to go for procurement of M4 grade of core only.  
 (6) Vendor have to confirm 3star losses as per GTP.

5. The materials of transformers should conform to relevant IS/IEC Standard (IS-1180 & IS-2026).

Indian Standard	Title	International and internationally recognised standards
IS:2026/1977 (Parts 1 to 5)	Specification for Power Transformers	IEC:76
IS:1180/1989 (Parts 1 & 2)	Outdoor distribution transformer up to and including 100kva	
IS:649/1997	Testing for steel sheets and strips and magnetic circuits.	
IS:5484	Specification for Al Wire rods	ASTM B:233
IS:9335	Specification for Insulating Kraft Paper	IEC 554
IS:1576	Specification for Insulating Press board.	IEC 641
IS:6162/1971 (Parts I & II)	Paper covered aluminium conductor.	
IS: 6160/1971	Rectangular electrical conductor for electrical machines.	
IS: 5561/1970	Electrical power connector.	
IS:10028/1985 (Parts I to III)	Insulating and maintenance of transformers.	
IS: 10028:	Selection, installation & maintenance of transformers	
	REC specification No.2	

## 6. **DETAIL SPECIFICATION OF CORE:**

### **Core Material: CRGO Material**

The core shall be high grade stack/wound type of cold rolled grain oriented annealed steel lamination having low loss and good grain properties, coated with hot oil proof insulation, bolted together and to the frame to prevent vibration or noise. The core shall be stress relieved by annealing under inert atmosphere if required. The complete design of core must ensure permanency of the core loss with continuous working of the transformers. The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated in the offer.

The Supplier should offer the core for inspection and approval by the purchaser during manufacturing stage.

The transformers core shall be suitable for over fluxing (due to combined affect of voltage and frequency) up to 12.5% without injurious heating at full load conditions and shall not get saturated. The Supplier shall furnish necessary design data & test certificate from origin for core assly & core-coil assly respectively.

No-load current shall not exceed 3% of full load current and will be measured by energising the core-coil assly at 433 volts, 50Hz on the secondary. Increase of voltage of 433 volts by 12.5% shall not increase the no-load current by 6% (maximum) full load current.

**CORE:**

- a) The core shall be of high grade CRGO steel sheet of M4 or 23ZDMH85 or superior to that having low loss and non ageing grain oriented, coated with hot oil proof insulation, bolted together to the frames firmly to prevent vibration or noise. All core clamping bolts shall be effectively insulated.

The complete design of core must ensure permanency of the core losses with continuous working of the transformers. The value of the flux density shall not be more than 1.7 tesla at 50 HZ.

The construction of core, internal clearances minimum effective area of cross section, minimum Nos. of core steps etc., shall be strictly as per the drawings enclosed.

- b) The transformers core shall not be saturated for any value of V/F ratio to the extent of 112.5% of the rated value of V/F ratio i.e., 11kV/50Hz. (Due to combined effect of voltage and frequency) upto 12.5% without injurious heating at full load conditions the core shall not be saturated.

The supplier shall furnish necessary design data in support of this condition

- c) The maximum thickness of core laminations shall not exceed 0.3mm. Further the lamination sheets used for top yoke, bottom yoke etc., shall be of single piece.
- d) For testing purpose core assly will be put together with the coil assly & No load current, shall be measured by energizing the transformers at 433 volts 50 C/S on the secondary for distribution transformers. Increase of voltage increase by 10% shall not increase the no load current disproportionately high. Test for magnetic balance by connecting the LV phase by phase to rated phase voltage and measurement of an, bn, cn, voltage shall be carried out. The no load current, shall not exceed 3% in respect at rated voltage and frequency.

The minimum

- (1) Effective core area
- (2) Number of core steps
- (3) Internal clearance

Shall be furnished by the Supplier along with the bid offer.

Minimum effective cross sectional area of the core to be provided are as follows:

- 1) 25KVA - 41.18 sq.cm.

**Note:** If the manufacturer uses the better quality CRGO steel for the core the manufacturer has to furnish the area of cross section of the core along with the design details.

The unbalance current in the neutral shall not be more than 2% of the rated current.

**CORE CLAMPING:**

- 1) M.S.Channel 75 x 40mm on top and bottom shall be used for clamping the core.
- 2) 2 Nos. of 12mm high tensile vertical bolts in parallel in each side shall be provided.

The size of the Bolts to be provided in parallel are as follows:

- a) 25 KVA - 2 Nos. of 12mm High Tensile Bolts
- 3) Channel on LV side to be reinforced at equidistance if hole cutting is done for LT lead so as to avoid bending of channel.
- 4) M.S. Channels are to be painted by varnish and corrosion oil resistant paint before use.
- 5) Flat or cut channel shall not be used.
- 6) Core mounting is to be done with ISF 50x10.
- 7) Clamping arrangement should be strong enough to withstand mechanical forces. The mechanical strength shall be proven by short circuit test.

#### **TIE BOLTS:**

Four horizontal tie rods (or high tensile steel) of 12mm dia to be used. Rods to be effectively insulated with kraft paper tube of thickness 1.5mm.

- i) All top and bottom Yoke nuts bolts and tie rods shall be painted with oil and corrosion resistant paint before use.
- ii) Channel - (top yoke) on LV side to be reinforced at equidistance if hole cutting is done to avoid bending of channel.
- iii) The flat provided at the core shall be as per the drawings enclosed and shall not be cut through the length.
- iv) Tie rods shall be effectively earthed.
- v) Drawing of the building of the core shall be got approved before start of the work

No load current shall not exceed 3% of full load current and will be measured by energizing the transformer at 433 volts, 50 HZ on the secondary. Minimum effective cross sectional area of the core to be provided: 41, 18 sq cm. The unbalance current in the neutral shall not be more than 2% of the rated current.

In case of voltage variation on 433 volts by 12.5 %, the no load current shall not increase by more than 6% of full load current. The core shall be high grade CRGO steel sheet of MOH/M4 /23ZDMH85 grade of thickness 0.23 mm or superior. The value of the flux density of core shall not be more than 1.7 Tesla at 50 HZ.

#### **7. DETAIL SPECIFICATION OF COIL:**

##### **WINDINGS:**

HV and LV windings shall be wound from Super Enamel covered/ Double Paper covered aluminium conductor.

LV windings shall be such that neutral formation will be at top.

Inter layer insulation shall be Epoxy dotted Kraft Paper.

Proper bonding of inter layer insulation with the conductor shall be ensured. Test for bonding strength shall be conducted.

Dimensions of winding coils are very critical. Dimensional tolerances for windings coils shall be within limits as specified in Guaranteed Technical Particulars.

Current density for HV and LV winding should not be more than 1.6 Ampere per sq mm for aluminium conductor.

The core/coil assembly shall be securely held in position to avoid any movement under short circuit conditions.

Joints in the winding shall be avoided. However, if jointing is necessary the joints shall be properly brazed and the resistance of the joints shall be less than that of parent conductor.

#### **WINDINGS:**

- a) **Material-** Double layer paper covered Aluminium conductor shall be used.
- b) The nominal HV winding cross section shall be as follows:

SL. No.	Rating	
1	25KVA	0.7854 Sq.mm.

- c) The nominal LV winding cross section shall be as follows:

SL. No.	Rating	
1	25KVA	18.33 Sq.mm.

- d) LV winding shall be in even layers
- e) The neutral formation shall be at top

**Note:** If any other than the above cross section of HV/LV windings, details shall be furnished.

#### **8. INSULATION, INSULATION MATERIAL& CLERANCES:**

Electrical grade insulation epoxy dotted Kraft Paper to be used for interlayer insulation.

All spacers, axial wedges/runners used in windings shall be made of pre-compressed Pressboard-solid, conforming to type B 3.1 of IEC641-3-2. In case of cross- over coil winding of HV all spacers shall be properly sheared and dovetail punched to ensure proper locking. All axial wedges/runners shall be properly milled to dovetail shape so that they pass through the designed spacers freely. Insulation shearing, cutting, milling and punching operations shall be carried out in such a way, that there should not be any burr and dimensional variations.

- a) Press board blocks at top and bottom of each coil assembly shall be provided. There must be atleast 4 blocks per phase/coil of each of thickness of 30mm. Core wrapper shall be of minimum of 1mm thick.

The channel at phase barrier board shall be of 2mm thick press board. The tie rod insulation craft paper shall be of thickness 1mm. Between HV and LV windings addition press Board cylinder of at least 2mm in addition to spacers shall also be provided.

- b) No. of vertical/axial wedges minimum 18 Nos., shall be provided depending upon the capacity of transformers between LV and HV windings and equispaced around LV. The wedge shall be minimum 6.5mm thick wide.
- c) The inter layer insulation shall be provided between HV windings layers depending on the design. The details shall be furnished.
- d) The Neutral connection of LT winding shall be formed using aluminium strip of same size as that of 'S' type link of size 25x3mm.
- e) The Delta formation of HV winding shall be made using copper jumper leads of size 1.6mm dia. for 25KVA, 2.65MM transformers. The leads shall be enclosed in Kraft insulated paper tube.
- f) Double paper covering shall be used for winding insulation both for HV & LV windings. Either preformed corrugated cylindrical boards or cylindrical compressed boards with spacers shall be provided between HV & LV windings. Press board of type - D IS: 1576 to be used for top and bottom yoke insulation. The electrical grade insulating paper shall be of Triveni/Ballarpur or equivalent make subject to approval of **AYCL**. Press boards used shall be of M/s. Senapathi whitely or M/s. Raman Boards or equivalent make subject to approval of **AYCL**.
- g) Radial clearance of LV coil to core (bare conductor) shall not be less than.
  - 1. for 25 KVA - 3.5MM
- h) Radial clearance between HV and LV coils shall not be less than 10mm for all capacities.
- i) Phase to phase clearance between HV coils shall not be less than 15mm. A minimum of 2 Nos. of 1mm press board shall be used to cover the tie rods.
- j) The minimum electrical clearance between the winding and body of the tank (between inside surface of the tank and outside edge of the winding) shall not be less than **30mm**.
- k) End insulation to earth shall not be less than 25mm.
- l) HV & LV coils single coil multi layer winding shall be used for all capacities of transformers.
- m) Tap lead shall be insulated with 1.5 mm thick paper insulation. Inspection of windings prior to tankings shall be done. Manufacturing drawing for the transformer showing various clearance shall have to be approved by the **AYCL**.

**9. The core assly, coil assly & core-coil assly shall conform to the following specific parameter:**



Sl No.	Item	11kv Distribution transformers
1.	System voltages (max).	12kV
2.	Rated voltages HV	11kV
3.	Rated voltages LV	433-250V
4.	Frequency	50Hz
5.	Phases	Three
6.	Connection HV	Delta
7.	Connection LV	Star (Neutral brought out)
8.	Vector group	Dyn-11
9.	Type of cooling	ONAN
10.	% of impedance at 75 °C	4.5%
11.	Fault level of the system	750MVA

Audible sound levels (decibels) at rated voltage and frequency for liquid immersed distribution transformer shall be as below (NEMA Standards)

kVA rating	Audible sound levels (decibels)
0-50	48
51-100	51

#### Weight (approx) of Major Materials:

- 1) CRGO-----80kg
- 2) HV(SEM)-----27kg
- 3) LV(DPC strip)-12kg
- 4) Insulation-----6kg

#### 10. TESTS:

Type tests, routine tests and acceptance tests shall be conducted on the items. All the items offered, shall be fully type tested as per the relevant standards.

#### TYPE TEST

The following shall constitute the type tests as per IS-1180 (Part I) and IS: 2026/CBIP manual.

- 1) Measurement of winding resistance
- 2) Measurement of voltage ratio and check of voltage vector relationship
- 3) Measurement of impedance voltage/Short circuit impedance and load loss.
- 4) Measurement of no-load loss and current
- 5) Measurement of Insulation resistance.
- 6) Induced over voltage withstand test.
- 7) Separate source voltage withstand test.
- 8) Impulse voltage withstand test: With chopped wave of IS: 2026

- part -III. BIL for 11kV shall be 95kV peak instead of 75kV.
- 9) Temperatures rise test
  - 10) Short circuit withstand test: Thermal & Dynamic ability.
  - 11) Permissible flux density and over fluxing.
  - 12) Un Balance current test: The value of unbalance current indicated by the Ammeter as shown in the test arrangement of CBIP manual shall not be more than 2% of the full load current.
  - 13) Magnetic balance test
  - 14) Noise level measurement.
  - 15) Measurement of Zero phase sequence impedance.

### **Routine Tests:**

The items manufactured shall be subjected to the following routine test, at the manufacturer's works - In accordance with IS: 1180 (Part I & II) and IS: 2026.

1. Measurement of voltage ratio, polarity, phase sequence and Check of voltage vector relationship
2. Measurement of impedance voltage/short circuit impedance and load losses at rated current and normal frequency.
3. Measurement of no load loss current and neutral current.
4. Measurement insulation resistance.
5. Neutral current measurement: The value of zero sequence current in the neutral of the star winding shall not be more than 2% of the full load current.
6. Measurement of no load losses and magnetizing current at rated frequency and 90%, 100% 110%, 112.5% of rated voltage.
7. Insulation resistance
8. 2. Separate source voltage withstand test
9. 3. Induced over voltage withstand test
10. 4. Measurement of windings resistance cold (at or near the test bed temperature)
11. Measurement of total losses at rated voltage and normal frequency (at 50% & 100% loading).
12. Checking of rating and terminal marking plate.
13. 10. Checking of weights, dimensions, material, finish, and workmanship as per purchase order and contract drawings.
14. Physical verification of core – coil dimension, internal clearances, provisions of required oil ducts in the HV and LV winding, conductor sizes, individual weights of HV and LV winding core laminations etc., with reference to contract drawings and type test report(s) .

The Supplier shall guarantee individually the no-load losses and loss without any positive tolerance. The Supplier shall also guarantee the total losses at 50% and 100% load condition (at rated voltage and frequency and at 75°C).

The maximum allowable losses & impedance at rated voltage and rated frequency permitted at 75°C for 11/0.433kV core assly/coil assly/core-coil assly as follows:

No load Voltage Ratio	Ratings (kVA)	Max Losses at 50% loading (watts)	Max Losses at 100% loading (watts)	Percentage impedance (subject to tolerance as per IS 2026)
11000 : 433	25	210	695	4.5%

#### 11. TOLERANCE:

No positive tolerance shall be allowed on the maximum losses displayed on the label for both 50% and 100% loading values.

#### Type and Routine Test certificates:

1. All the type and routine tests as stipulated in the relevant standards shall be carried out by the supplier in the presence of **AYCL** representative.
2. It may also be noted that the purchaser reserves the right to conduct short circuit test and impulse voltage withstand test in accordance with the IS for the core-coil assembly. The findings and conclusions of these tests shall be binding on the supplier.
3. Immediately after finalization of programme of type/ acceptance/ routine testing, the supplier shall give advance intimation to the **AYCL** to enable to depute its representative for witnessing the tests. The routine test certificate shall be submitted along with inspection offer.

#### ACCEPTANCE TEST:

Checking of weights, dimensions, material, finish and workmanship as per GTP and contract drawings.

Physical verification of core assly, coil assembly and core-coil assly & measurement of flux density of each unit with reference to short circuit test report

Temperature rise test may be carried out at random at the discretion of AYCL.

CRGO mill test certificate required.

Insulation materials should be of Raman brand.

Both DPC Al Strip & Super enameled Al conductor will be independently checked as per the parameters of enclosed drawing & GTP.

Epoxy dotted craft paper to be used for inter layer insulation.

The type tests & routine tests mentioned above to be conducted on the items case to case basis.

**12.** Checking of manufacturer's test certificates and invoices for major raw materials shall be done and copies thereof duly signed by firm's representatives and inspecting officers shall be enclosed with the inspection report. CRGO mill test certificate required. For Al conductor, DPC Al strip, test certificate from origin is required.

Invoices of CRGO material & Al conductor & Al strip shall be provided by the supplier to the inspecting officer at the time of inspection and same shall be verified by the inspecting officer.

**Following tests shall also be carried out at manufacturer's works on the selected units:**

- i) Measurement of unbalance current.
- ii) Magnetic Balance Test (See note below)

**NOTE:**

**1. Insulation Resistance:**

Insulation resistance of the units shall be measured with a 2500V Megger, of standard make. The minimum insulation resistance shall be furnished by the supplier.

**2. MAGNETIC BALANCE TEST:**

This test shall be conducted as an additional test on one sample unit from each lot offered for inspection.

NOTE: For every LOTs, purchaser (**AYCL**) at its discretion may conduct type tests at CPRI. In such cases, the testing charges will be borne by the purchaser in case the selected unit withstands type tests. If the selected unit fails in type tests, then the testing charges shall be borne by the supplier only & the offered lot for inspection will be rejected. Item wise & quantity wise L1 will be determined on landed cost basis

Offer to be made on annual rate contract basis.

In the rate contract, the order quantity is to be placed on all the vendors, who have agreed to negotiated L1 rate & terms, provided preference will be given to original L1 which will be more than 50% considering his technical and commercial ability and the remaining quantity will be procured from L2, L3 etc. where preference will be given to L2 considering the original value. The quantity for L2 will depend upon his technical & commercial ability and should not be more than 30% of the total quantity. Balance will go to L3 and other vendors following same principle. However AYCL also reserves the right to place full quantity of tender to only L1 bidders for respective items if necessary.

Special Note: Guaranteed Technical Particulars & Drawing along with the details are enclosed herewith.

AYCL reserves the right to reject the offer without assigning any reason whatsoever.