

DEDICATED FREIGHT CORRIDOR CORPORATION OF INDIA LIMITED
(A Government of India Enterprise)

ADDENDUM No. 6, DATED 31.1.2013
ADDENDUM /AMENDMENTS TO THE BID DOCUMENT FOR
SYSTEM WOKS CONTRACT PACKAGE
NCB No.: HQ/SYS/DB/INKWD-DGO

S. No.	Part	Sec	Volume	Pg. No.	Item	Clause	Addendum/ Amendment(s)
1	3	VII	--	22	Adjustment for changes in cost	13.8	Replace contents of clause 13.8 b) Part 3, Section VII, Particular Conditions on page 19 of 52 for Price Variation Clause for Traction Power Transformer/Auto Transformers complete with all accessories and components/cost centre : C.5.1, C5.2,C.6.1 & 7.1) as below: "Price Variation clause for power transformers complete with all accessories and components (of ratings above 10 MVA or voltage above 33 KV) issued vide ieema circular No.037/DIV/TRF/05 dated 6 th Feb., 2009 & Circular No. IEEMA/PVC/POWER/2003(R-1) effective from 1 st January 2009 shall be applicable(copy enclosed)."
2	2	V(B)	9	Annexure-XIII	Specification for Transformer	Cl. No. 9 of Pg 7/61	Add following at the end of clause No.5.1(9) of Annexure XII: For single secondary winding (1x54 kV): % Z= 11-13% Definitions can be seen in Annexure B-1 (copy attached).

Cir. No.: 037/DIV/TRF/05

06th February 2009

To Members of Transformer Division, Utilities, SEBs and other purchasing organizations
To the subscribers of Transformer PV circulars

Sub: Revision of PV clauses of Transformers

IEEMA has been operating Price variation clauses for various electrical equipment including Transformers. Transformers PV clauses were newly evolved and made operational from June 2003.

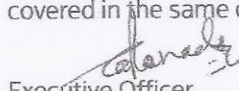
With the passage of time and over the last five years, it is observed by the Transformer industry that the manufacturing processes have improved tremendously due to adoption of new technologies, quality management systems etc. This has resulted in reduction of lag period for purchase of major raw materials like metals, oil etc. It is also desired that prices of raw materials need to be closer to actual market prices for fairer PV clauses.

The Transformer division of IEEMA has deliberated on this subject along with appropriate sources of various raw materials. Accordingly the division has revised PV clauses for Transformers; Domestic and Export/Deemed Export contracts (Power, Distribution, Dry type and REC range) by incorporating required changes, which are as under.

1. TOBS price is replaced by domestic price of finished Transformer Oil as per IS 335: 1993, supplied in drums; as demanded by some utilities and suppliers/repairers since off-late, TOBS prices were not reflecting a trend, which is close to market reality.
2. For Power Transformers, lag period of Copper prior to delivery has been reduced to two months, and the same for CRGO Electrical Steel, Insulating materials and Transformer Oil to one month.
3. For Copper wound Distribution, Dry type and REC Transformers, lag period of Copper and Transformer Oil prior to tendering as well as prior to delivery has been reduced to one month.
4. For Aluminium wound Distribution and REC Transformers, lag period of Transformer Oil prior to tendering as well as prior to delivery has been reduced to one month.
5. PV circular is designed in such a way that circular for one month prior to the date of tendering or date of delivery would cover required prices and indices. However, circular for the current month will be circulated in 1st week of next month due to late receipt of LME average Copper price.

We had circulated the 'Draft' PV clauses vide circular No. 204/DIV/TRF/05 dated September 30, 2008. Since no adverse comments have been received, IEEMA Transformer division has approved for releasing the PV clauses and making them operational from 1st January 2009.

We are now enclosing final PV clauses for Transformers along with applicable basic price circular for the month of January 2009. We recommend incorporating these PV clauses in the forthcoming contracts/tenders. Basic prices and indices applicable for the PV clauses effective from June 2003 are covered in the same circulars and will be continued till December 2009.


Executive Officer
Encl: as above

Nr/c:\trf-pvc-2008/circular_PVrevision.doc

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Indian Electrical & Electronics Manufacturers' Association

IEEMA/PVC/POWER/2003 (R-1)

**PRICE VARIATION CLAUSE FOR POWER TRANSFORMERS
COMPLETE WITH ALL ACCESSORIES AND COMPONENTS
(Of ratings above 10 MVA or voltage above 33 KV)
supplied against domestic contracts**

This price variation clause is applicable for 'Power Transformers' of all type including Auto, Generating Transformers etc. with either rating of above 10 MVA or voltages above 33 KV. The clause is to be used for domestic contracts. A separate price variation clause IEEMA/PVC/POWER/DE/2003 (R-1) has been evolved for above types of Transformers supplied against export/deemed export contract against duty free inputs under special imprest licensing scheme.

The price quoted/confirmed is based on the input cost of raw materials/components and labour cost as on the date of quotation and the same is deemed to be related to prices of raw materials and all India average consumer price index number for industrial workers as specified in the price variation clause given below. In case of any variation in these prices and index numbers, the price payable shall be subject to adjustment, up or down in accordance with the following formula:

$$P = \frac{P_0}{100} \left(13 + 23 \frac{C}{C_0} + 28 \frac{ES}{ES_0} + 7 \frac{IS}{IS_0} + 7 \frac{IM}{IM_0} + 7 \frac{TO}{TO_0} + 15 \frac{W}{W_0} \right)$$

Wherein,

- P = Price payable as adjusted in accordance with the above formula.
- P₀ = Price quoted/confirmed.
- C₀ = Average LME settlement price of copper wire bars (refer notes)
This price is as applicable for the month, two months prior to the date of tendering.
- ES₀ = C&F price of CRGO Electrical Steel Sheets (refer notes)
This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.
- IS₀ = Wholesale price index number for 'Iron & Steel (Base: 1993-94=100)' (refer notes)
This index number is as applicable for the week ending 1st Saturday of the month, three months prior to the date of tendering.
- IM₀ = Price of Insulating Materials (refer notes)
This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.
- TO₀ = Price of Transformer Oil (refer notes)
This price is as applicable on the 1st working day of the month, one month prior to the date of tendering.
- W₀ = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2001 = 100)
This index number is as applicable on the first working day of the month, three months prior to the date of tendering.

IEEMA/PVC/POWER (R-1)/2003/1/3

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IEEMA/PVC/POWER/2003 (R-1)

Effective from: 1st January 2009

For example, if date of tendering falls in May 2008, the applicable price of Copper Wire Bars (C_0) should be for the month March 2008, where as the applicable price of CRGO Steel Sheets (ES_0), Insulating material (IM_0) and Transformer Oil (TO_0) should be as on 1st April 2008 and Wholesale price index number for 'Iron & Steel' (IS_0) should be for the week ending first Saturday of February 2008 and all India average consumer price index no. (W_0) should be for the month of February 2008.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA(PVC)/TRF (R-1)/ / / one month prior to the date of tendering.

- C = Average LME settlement price of copper wire bars (refer notes)
This price is as applicable for the month, two months prior to the date of delivery.
- ES = C&F price of CRGO Electrical Steel Sheets (refer note)
This price is as applicable on the 1st working day for the month, one month prior to the date of delivery.
- IS = Wholesale price index number for 'Iron & Steel (Base: 1993-94=100)' (refer notes)
This index number is as applicable for the week ending 1st Saturday of the month, three months prior to the date of delivery.
- IM = Price of Insulating Materials (refer notes)
This price is as applicable on the 1st working day of the month, one month prior to the date of delivery.
- TO = Price of Transformer Oil (refer notes)
This price is as applicable on the 1st working day of the month, one month prior to the date of delivery.
- W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2001 = 100)
This index number is as applicable on the first working day of the month, three months prior to the date of delivery.

For example, if date of delivery in terms of clause given below falls in December 2008, the applicable price of Copper Wire Bars (C) should be for the months October 2008; where as applicable prices of CRGO Steel Sheets (ES), Insulating material (IM) and Transformer Oil (TO) should be as on 1st November 2008 and Wholesale price index number for 'Iron & Steel' (IS) should be for the week ending first Saturday of September 2008 and all India average consumer price index no. (W) should be for the month of September 2008.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA(PVC)/TRF (R-1)/ / / one month prior to the date of delivery.

The date of delivery is the date on which the transformer is notified as being ready for inspection/despatch (in the absence of such notification, the date of manufacturer's despatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

IEEMA/PVC/POWER/2003 (R-1)/2/3

IEEMA/PVC/POWER/2003 (R-1)

Effective from: 1st January 2009

Notes: (a) All prices of raw materials are exclusive of modvatable excise/CV duty amount and exclusive of any other central, state or local taxes, octroi etc. transformers manufacturers import major raw materials like Copper, CRGO Steel Sheets and Insulating pressboards etc. The landed cost of these imported raw materials includes applicable custom duty but exclusive of modvatable CVD.

(b) All prices are as on first working day of the month.

(c) The details of prices are as under:

- 1) The LME price of Copper Wire Bars (in Rs./MT) is the LME average settlement price of Copper Grade A for one month prior to the month of the circular converted into Indian Rupees with applicable exchange rates prevailing as on 1st working day of the subsequent month. This price is the landed cost, inclusive of applicable customs duty only but exclusive of countervailing duty.
- 2) The price of CRGO Electrical Steel sheets (in Rs./MT) suitable for Transformers of ratings above 10 MVA or voltage above 33 KV is the average C&F price in US \$ per MT converted into Indian Rupees with applicable exchange rate prevailing as on 1st working day of the month, as quoted by primary producers. This price is the landed cost, inclusive of applicable customs duty only but exclusive of countervailing duty.
- 3) The wholesale price index number for 'Iron & Steel' is as published by the Office of Economic Advisor, Ministry of Industry, Govt. of India, New Delhi with base 1993-94=100. This wholesale price index number is being published weekly on provisional basis. However, the same gets finalized after eight weeks and is normally available after two months. Therefore, we are considering in our calculations this final index for the first Saturday of the months two months prior to the date of which the prices of other raw materials such as Al, IM are published for the corresponding month.
- 4) The price of Insulating materials (in Rs./Kg) of pre-compressed pressboards of size 10 mm thick, 3200 mm x 4100 mm is the average C&F price in free currency per MT converted into Indian Rupees with applicable exchange rates prevailing as on 1st working day of the month as quoted by primary suppliers. This price is the landed cost, inclusive of applicable customs duty only but exclusive of countervailing duty.
- 5) The price of Transformer Oil (in Rs./K.Ltr) is the average price on ex-refinery basis as quoted by two manufacturers for supply in drums.

(d) Some purchasers are purchasing oil immersed Transformers from manufacturers without first filling of oil. Oil for first filling is procured and filled by the purchasers. For such supplies PVC formula, excluding Oil will apply as under:

$$P = \frac{P_0}{93} \left(13 + 23 \frac{C}{C_0} + 28 \frac{ES}{ES_0} + 7 \frac{IS}{IS_0} + 7 \frac{IM}{IM_0} + 15 \frac{W}{W_0} \right)$$

Where description of P, P₀, C, ES, IS, IM and W etc. remains same as mentioned earlier.

Sm...
Authorised Signatory

Percentage Impedance Voltages of Scott-Connected Transformer with Two Secondary Windings per Each Phase.

Three leakage impedances for each μ - and λ -phase of Scott-connected transformer - $Z_{\mu 12}$, $Z_{\mu 31}$ and $Z_{\mu 23}$; $Z_{\lambda 12}$, $Z_{\lambda 31}$ and $Z_{\lambda 23}$ - can be measured by the methods shown in Fig. 1.

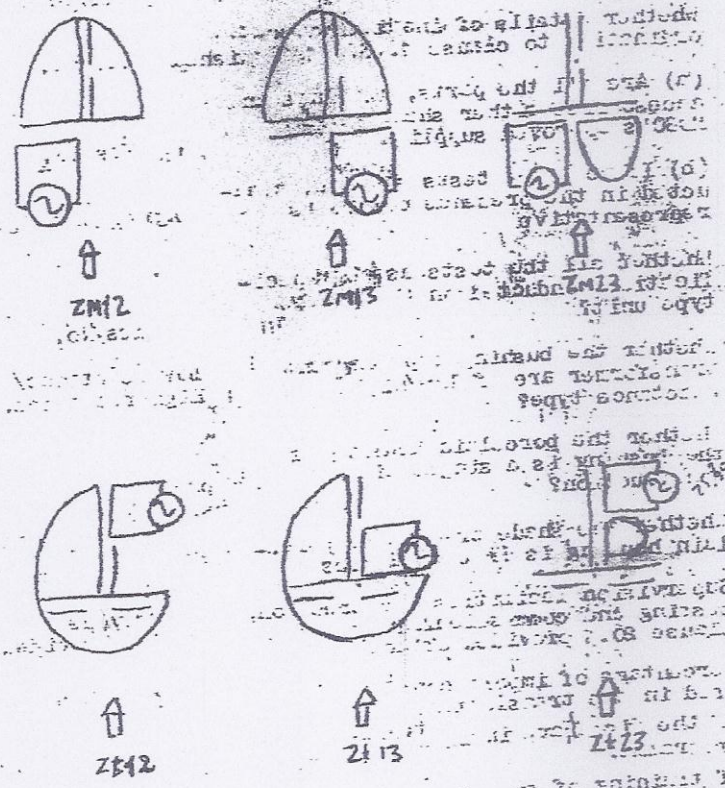


Fig. 1 Measuring Methods of Three Leakage Impedances

Next, the leakage impedance converted to the transformer secondary sides - Z_{mt} , Z_{mn} and Z_{mf} and Z_{tt} , Z_{tn} and Z_{tf} are calculated by the following formulas.

$$Z_{mt} = \frac{3Z_{m12} + Z_{m31} - Z_{m23}}{2} \quad Z_{tt} = \frac{3Z_{t12} + Z_{t31} - Z_{t23}}{2}$$

$$Z_{mn} = \frac{Z_{m23} - Z_{m12}}{2} \quad Z_{tn} = \frac{Z_{t23} - Z_{t12} - Z_{t31}}{2}$$

$$Z_{mf} = \frac{3Z_{m31} + Z_{m12} - Z_{m23}}{2} \quad Z_{tf} = \frac{3Z_{t31} + Z_{t12} - Z_{t23}}{2}$$

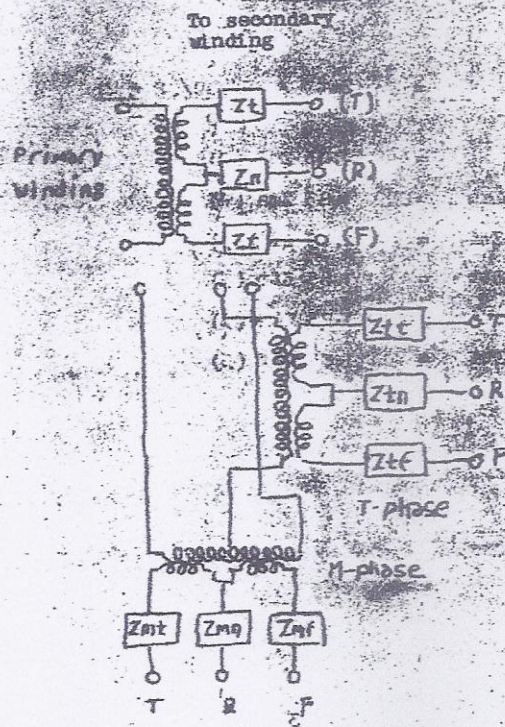


Fig. 2 Z_t , Z_n and Z_f

(x) Percentage impedance voltage at 22 MVA base (by phase) for each phase of Scott-connected transformer shall be expressed by the following three percentage impedance voltages converted to the secondary winding's windings.

Z₁₂: (12 ± 1.2)% at the principal tap position.

Z₂₁: (12 ± 1.2)% at the principal tap position.

Z₂₂: -0.2 to + 3.5% at the principal tap position.

(v) Measuring and calculation methods of the percentage impedance voltages shall be in accordance with Clause 15.1.2.4.

(xi) Non-cumulative over load capacity after the transformer has reached steady temperature on continuous operation at full load

(a) 50% for 15 minutes.

(b) 100% for 5 minutes.

(xii) Polarity

Subtractive

(xiii) Tappings (off-circuit)

Separate tapped windings on the secondary side to give rated secondary voltage for each phase for variation between +10% and -15% in step of 5% each.

(xiv) Temperature rise

See Clause 15.1.2.4.

(v) Maximum permissible losses at the tap principal position

- a) No-load loss 50 kW
- b) Load loss 200 kW