

TENDER SPECIFICATION  
NO. CLM/ES/T-30 WITH  
SKETCH NO. CLM/ES/SK-1/  
T-30.

SPECIFICATION FOR 25 KV

SINGLE PHASE

50 CYCLES

A.C. ELECTRIC LOCOMOTIVES

STEP DOWN TRANSFORMER

FOR

TFWT (WALKER TALKIE CHARGER )

(TFWT)

( FOR LOCO WITH STATIC CONVERTER )

OFFICE OF THE DY. CH. ( IRS & DEV )  
CHITTARANJAN LOCOMOTIVE WORKS  
CHITTARANJAN, WEST BENGAL  
I N D I A

TOTAL SHEET NO. 11

TFWT-CH. TRANSFORMER  
(TFWT)

*Dee*  
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WEST BENGAL, INDIA  
CLM/ES/T-30  
क्रमांक/NO. 20-03-06.  
दिनांक/DATE :

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1.0 SCOPE

1.1 This specification covers the requirement and supply of 100 VA 415/220 V step Down Transformer for W.T.Charger provided on the 25 KV, Single Phase 50 Hz  $\pm$  3% ac Electric Locomotives.

2.0 GOVERNING SPECIFICATION

2.1 The transformer shall generally conform to IS:1416 - for Safety Transformers with the exception of secondary voltage.  
2.2 The material used in the manufacture of unit shall comply with the following latest IS specification.

1. IS:3024 - Electrical sheet steel (oriented).
2. IS:1271 - Classification of Insulating materials for electrical machinery and apparatus in rotation to the thermal stability in service.
3. IS:4800 (Part y) - Enamelled round winding wire for elevated temperature.
4. IS:2602 - Cadmium anodes for Electro Plating.
5. IS:1068 - Electroplated coatings of nickel and chromium on Iron and Steel.
6. IS:1650 - Colours for building and decorative finished.

2.3 Any deviations from this specification calculated to improve the performance, utility and efficiency of equipment proposed by the manufacturer will be given the consideration provided full particulars with justification thereof are furnished in the tender.

3.0 SERVICE CONDITION.

3.1 The equipment shall be suitable for working satisfactorily in an ambient temperature varying from 0°C to 60°C and a max. relative humidity of 100%. The locomotive shall be working in an altitude upto a maximum of 1000 metres above mean sea level and to dusty atmospheric conditions.

3.2 The W.T.Charger Transformer and its mounting arrangement shall be of robust design for traction duty and shall withstand satisfactorily the vibrations and shock normally encountered in service as indicated below: -  
Maximum Vertical Acceleration - 1.0 g.

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T.FWT CHARGER  
TRANSFORMER.

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Maximum lateral Acceleration = 0.5 g.

Maximum longitudinal Acceleration =  $\pm 3.0$  g.

'g' being acceleration due to gravity.

3.3 Frequency of power supply = 50 Hz  $\pm 3\%$

4.0 TECHNICAL SPECIFICATION.

4.1 Rating.

4.1.1 The transformer shall be single phase of type Class-I double insulated, non inherently short circuit proof, air cooled drip proof and suitable for horizontal mounting on a bracket. The design parameters are given below :-

- i) Rated voltage primary. : 415  $\pm 5\%$
- ii) Rated voltage secondary : 220  $\pm 5\%$
- iii) Rated frequency : 50 C/S  $\pm 3\%$
- iv) Normal rating : 100 VA
- v) Weight. : As light as possible.

4.1.2 Fuse :

The transformer shall be protected by 1 Amp. Glass cartridge fuse on the 415 volts input side by the purchaser. (Not to be provided with the transformer).

4.1.3 Regulation :

The percentage regulation of the transformer shall not exceed 10%.

4.2.0 Type of insulation - Class 'F'

4.3.0 Type of cooling - Air naturally cooled.

4.4.0 Terminals :

All the terminals of the unit shall be brought out on a suitable terminal board. The input and output terminals shall be legible and indelibly marked on the plate. The terminal arrangement shall be subject to approval of Dy. Chief Elect. Engineer(D<sub>3</sub>)/ CLW/Chittaranjan prior to manufacture. In addition and earthing terminal shall be provided as shown in the enclosed drawing.

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4.4.1 Suitable spring washer and nuts for external connections shall be provided on all the terminals including earth terminal.

4.5.0 Mounting: The transformer shall be horizontally mounted inside the locomotive and mounting arrangement shall be subjected to approval of the Dy. Chief Elect. Engineer(D)/CLM/CRJ.

4.6 Hardware: All components including bolts, nuts, washer, screws etc. of the transformer shall be suitably protected against corrosion and rust. All hardware items shall be suitably cadmium plated. Brass studs, washers, nuts etc. approved for input and output terminals shall be bright nickel plated. These shall conform to IS:2602 and and IS:1066, enclosure.

4.7 Finish: The transformer shall be enclosed in a suitable Finally finished and painted light grey in accordance with colour No.631 of IS:5.

4.8 Rating Plate: A rating plate in anodised aluminium shall be provided in the unit to show the rating, insulation etc. The following particulars shall be clearly and indelibly marked on the rating plate: -

- a) Manufacturer's name/Brand name/Monogram if any
- b) Manufacturer's serial number
- c) Year and month of manufacture
- d) Rated input voltage
- e) Rated output voltage
- f) Rated frequency (with permissible variation as a percentage)
- g) Rated output in amperes/volt amps/watts for each winding.
- h) Class of insulation.

The rating plate design and its mounting shall be subjected to approval of Deputy Chief Elect. Engineer(D)/CLM/Chittaranjan prior to manufacture.

Drawing: CLM/ES/SK-1/T-30 indicating overall and fixing dimensions is attached herewith.

5.0 INSPECTION AND TESTS

Tests are classified as 'Type test' and 'Routine Tests' Type Tests shall be carried out on one equipment for a batch of 20 sets of equipment supplied. Routine tests shall be carried out on every unit.

5.1 INSPECTION

5.1.1 All dimensions, overall mounting arrangement, Terminal Box, creepage distance etc. shall be checked with the drawing.

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दिनांक/DATE : 20-03-2006.

5.2 TYPE TESTS

5.2.1 Resistance Measurement:

The resistance of the winding when cold, shall be measured by bridge or voltage drop method. ~~of test, voltage, current, resistance values and the temperature of each winding shall be recorded.~~ In case of voltage drop method, the current shall be limited to 50% of the rated current of the winding.

5.2.2 Measurement of no-load output voltage & no-load losses.

When the transformer is at ambient temp. the output voltage, input current and power shall be measured and recorded for input voltages of 394 & 436 volt.

5.2.3 Measurement of output voltage at full load :

With the input primary voltage of 394, 415 and 436 volts. resistive load connected to the secondary shall be so adjusted that VA output is equal to the rated output (100 VA) in each case and output voltage shall be recorded at ambient temperature. The transformer shall be allowed to attain steady temp. and the output voltage shall be measured again. These shall be 209, 220, 231 volts respectively with a tolerance of 5%. Percentage regulation thus worked out shall not exceed 10%.

5.2.4 Temprise test :

The temperature rise test shall be conducted as per clause No.13.9 of IS specification No.1416.

Rise in temp. measured by resistance method shall not exceed the limits specified below :-

Parts	Max. permissible temp. rise in temp.
i) Wdg. with class(E) Insulation.	65°C
ii) Iron core and other parts in thermal contact with wdgs.	65°C
iii) External enclosures.	30°C
iv) Connecting terminals.	30°C
v) Rubber Insulation, if any used	25°C

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5.2.5 Short circuit & over load protection:

This test shall be conducted in accordance with clause 13.10 of IS specification No. 1416. But temp. rise measured by resistance method at the end of this test shall not exceed the limits specified below:

<u>Parts</u>	<u>Max. permissible Temp. rise</u>
1. Wdg. with class 'E' Insulation.	130°C
2. External enclosure	85°C
3. Rubber of thermo-plastic insulation	35°C

5.2.6 Insulation Resistance & Di-electric test:

The insulation resistance between live parts and accessible metal parts and between input and output windings shall be measured with 500V meggar. The value obtained shall not be less than 5 meg. ohms for insulation between input and output windings and 2 meg. ohms- for other insulations.

The transformer shall then be subject to di-electric test by supplying ac voltage of sine wave form at a frequency of 50 c/s and the values of the test voltage shall be as under:

<u>Points of application of voltage</u>	<u>Value of test voltage.</u>	<u>Duration of application</u>
1. Between input circuit & body insulated from earth	1500V	1 Min.
2. Between output circuit & body insulated from earth	1500V	1 Min.
3. Between input & output windings.	1500V	1 Min.

No flash over or break down shall occur during the above tests.

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5.3 Routine TEST

- 5.3.1 Resistance Measurement: This shall be done as given in para 5.2.1
- 5.3.2 Measurement of no-load voltage and no-load loss as described in para 5.2.2
- 5.3.3 Measurement of puput voltage at full load. This shall be done as given at 5.2.3 above for 415V input supply only at ambient temperature.
- 5.3.4 Measurement of Insulation resistance and di-electric test as described in para 5.2.6

6.0 TECHNICAL DOCUMENTS

The manufacturer shall supply the following documents along with the supply of first batch of transformer.

6.1 Type test certificate

This shall be supplied in standard 'A4' size of sheets with punched holes for filing. It shall be suitably enclosed in a cover. Type test reports shall be signed both by the suppliers engineers and CLK's engineers. 4 copies of the type test report shall be supplied.

- 6.2 Routine test certificate: This shall be supplied in standard 'A4' size sheets with punched holes for filing. Routine test certificate shall be submitted along with individual transformer in 4 copies.

6.3 Drawing

The supplier shall submit four copies of the "AS MADE" drawings for the transformer, mounting plate, enclosure etc. showing the overall dimensions, mounting arrangement details of coils, studs, bolts, nuts, washers etc. along with their specifications.

6.4 Maintenance instructions and trouble shooting charts:

The supplier shall give 4 copies of maintenance instructions and trouble shooting charts. These will be prepared in A4 size paper and shall contain full technical particulars detailed dimensional drawing and description of the components used to enable purchase of replacement parts.

7.0 SPECIAL INSTRUCTIONS TO TENDERERS

- 7.1 Tender papers : The tenderer shall submit 4 copies of his complete tender & these should be marked 'ORIGINAL', 'DUPLICATE 2 & 3' etc.

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7.1.1 The following documents shall accompany the tender without which the tender may be treated as incomplete and rejected.

- i) Clausewise comments on the specification and test programme.
- ii) Deviations statement in terms of clause-2.3.
- iii) List of recommended spares for maintenance of the equipment for two years.
- iv) Technical documents and drawings for the following :-
  - a) General outline drawing of the proposed transformer.
  - b) General outline drawing of the assembled transformer showing the details of fittings & accessories.
  - c) Schematic drg. of the transformer.
- v) The schedule of guaranteed particulars of the transformer to be furnished with tenders as indicated in Annexure-I.
- vi) Sufficient information to prove that the manufacturer has adequate facilities and capacity to manufacture and test the equipment offered.

7.2 Guarantee

The supplier must give a clear guarantee of 24 months from the date of supply or 18 months from the date of commissioning, whichever ever is earlier. If any defect is noticed or failure occurs during this period due to defective material or workmanship or faulty design, the supplier shall have to give replacement free of cost.

7.3 Conditions of contract

7.3.1 The standard I.R.S. conditions of contract will be applicable for the supply of these transformers.

7.3.2 Technical documents and drawings etc. shall be supplied the supplier as a part of the contract.

7.4.0 Approval of samples

7.4.1 The supplier shall make available one prototype for inspection and tests at his work and advise the Dy. Chief Elect. Engineer/ Design ~~...~~ Chittaranjan and Controller of Stores/Calcutta as & when he is ready with the prototype and necessary testing and measuring apparatus and facilities for carrying out the tests.

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 तिथि/DATE : 20-3-06.

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- 7.4.2 If it is considered necessary by the Dy. Chief Elect. Engr. / D of his authorized representative to carry out certain tests of the prototype at Chittaranjan, the supplier will arrange to send the sample to Dy. CEE (D).
- 7.4.3 Any short comings or defects in the design and workmanship shall be pointed out after the tests, to enable the manufacturer to incorporate the necessary improvement before bulk manufacturer is commenced, without affecting the guaranteed deliveries or guaranteed performance characteristics.
- 7.4.4 Any testing and approval by the purchaser of the design, working drg. and prototype shall in no way absolve the supplier of his responsibilities under the terms of the contract for the equipment supplied.
- 7.4.5 The supplier shall not offer any consignment of series production to the Inspector authorized under the contract until the prototype has been finally approved.
- 7.5 **PROGRESS REPORT :**  
The contractor shall furnish monthly progress report one copy each to controller of Stores/CLM/Calcutta, Chief electrical engineer (Insp), Dy. Chief electrical engineer (D), Dist Controller of Stores (SL)/CLM/Chittaranjan during the first week of every month showing the position of supply.
- 7.6 CLM Reserves the right to procure materials only from ISO Certified firms.

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आदेश/NO. CLM/95/2-30  
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SCHEDULE OF GUARANTEED PERFORMANCE, TECHNICAL & OTHER PARTICULARS

1. Name of the manufacturer.
2. Type, make and model.
3. Standard specification on which the performance data is based.
4. Continuous maximum rating for specified cooling, temperature rise & ambient temperature.
5. Number of phases.
6. Volts :- Input and output (range of variation).
7. Full load current :- Input and output.
8. Continuous & Overload rating and input power factor.
9. Class of insulation and its details.
10. Method of ventilation.
11. Maximum temperature rise in windings by resistance over maximum ambient temperature of 50°C with test conditions specified in S.2.4 of the specification.
12. Maximum temperature rise of core.
13. Efficiency at full load or nominal voltage of 415V.
14. Winding Data
  - a) Type of winding.
  - b) Number of turns on - i) 415V winding, ii) 220V winding.
  - c) Winding conductor size and current density for :-  
i) 415V winding, ii) 220V winding.
  - d) Insulation covering on conductors (indicate specification to which they comply).
  - e) Resistance of windings at (20°C) - i) 415V winding,  
ii) 220V winding.
  - f) Details of varnish for impregnation and impregnation procedure.
  - g) Insulation resistance - i) 415V winding, ii) 220V winding.
15. Type and particulars of terminal box and cable entry (furnish drawing).
16. Dimensions of the assembled unit.
  - a) From base to top most point, b) Overall breadth,
  - c) Overall length.
17. Total weight of the unit.

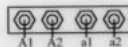
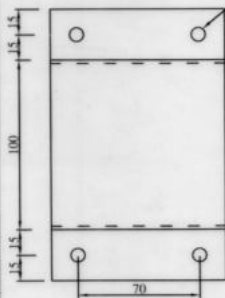
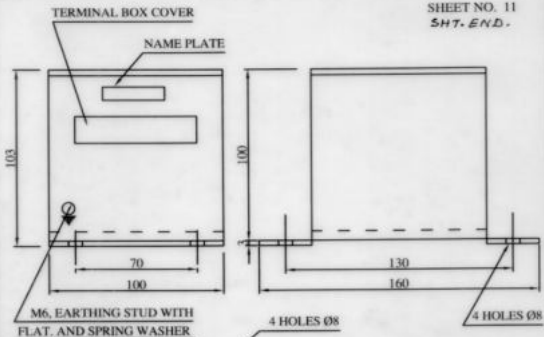
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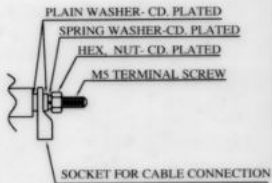
  
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DETAILS OF TERMINAL ARRANGEMENT



NOTE :-

1. ALL DIMENSIONS ARE IN MM.

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**SPECIFICATION FOR  
TRANSFORMER FOR  
WALKIE TALKIE CHARGER**

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CHITTARANJAN LOCOMOTIVE WORKS  
WEST BENGAL, INDIA  
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DATE:- 20-03-2006