PVVNL-MT/MM/49(s)/22-23

SCHEDULE I-A OF GUARANTEED TECHNICAL PARTICULARS FOR SUPPLY OF OUTDOOR TYPE THREE PHASE 11/.4 KV 400 KVA DISTRIBUTION TRANSFORMERS (AS PER AMENDED BIS LEVEL-1) ALONG WITH 3 NOS. LIGHTNING ARRESTOR (9 KV) ALONGWITH 1 NO. LT BOX AND 1 NO. 4 POLE LT MCCB FOR EXTERNAL PROTECTION FOR EACH TRANSFORMER

S.N. Particulars :

A. Name of Manufacturer & :

B. Place of manufacture :

C. Make :

1. Name of Tenderer :

2. Type **:**

3. Rating **:**

   (a) Rated output (KVA) :

   (b) Rated voltage-H.V. (Volts) :

   (c) Rated Voltage-L.V. (Volts) :

   (d) No load voltage ratio :

   (e) No. of phases :

   (f) Frequency (c/s) :

   (g) Vector Group :

4. Method of Cooling Radiator type :

5. Internal Dimensions of Tank

   (a) Length (mm) :

   (b) Breadth (mm) :

   (c) Height (mm) :

   (d) Thickness of tank sheets :

      (i) Sides (mm) :

      (ii) Top & Bottom (mm) :

6. DETAILS OF CORE

(a) Diameter (mm) :

(b) Window Height (mm) :

(c) Limb Center (mm) :

(d) Width of the main step :

(e) Whether yoke is plain or stepped inside window :

(f) Cross Sectional Area (sq.mm.) :

(i) Gross :

(ii) Nett :
(Staking factor of 0.97 shall be taken)

(g) Working flux density at rated voltage & frequency (Tesla) actual as per your design. :

(h) Over fluxing without saturation :
(Curve to be furnished by the manufacturer in support of his claim)

(i) Insulation Material provided for core :

(j) Grade of Material & Thickness of Lamination used (mm) :

(k) Total min.weight of stamping used in core and yoke (kg.) :
(Please furnish core weight calculations, details of core steps and its drawing)

7. <u>H.V. COIL CONSTRUCTION DETAILS :</u>

(a) Type of winding(copper) :

(b) Type & Size of Conductor (Bare) mm :

(c) Size of conductor insulated(mm) :

(d) Cross Sectional area of Conductor (mm^2)

(i) Gross :

(ii) Nett :

(e) No. of Coils per Limb :

(f) Outer Diameter of Coil (mm) :

(g) Inner Diameter of Coil (mm) :

(h) Mean Diameter of Coil (mm)

(i) Insulation of Conductor :

(j) Interlayer reinforcement details :

i) Top & bottom layer :

ii) In between all layers :

iii) End turn insulation :

iv) Whether wedges are provided at 50% turns of HV coil. :

(k) Current at full load (Amp) :

(l) Working current density as per your design (Amp/Sq.mm) :

(m) Weight of bare conductor used in one leg of H.V. (Kg.) :

(n) Weight of insulated conductor used in one leg of H.V. (Kg.) :

(o) No. of turns per leg :

(p) Length of mean turns (mm) :

(q) Resistance of winding (with ±5% tolerance)

a) at 20 °C (Ohms) :

b) at 75 °C (Ohms) :

(r) I^2R at 75°C. :

(s) Axial Length (mm) :

(u) Weight of oil soaked coils in one leg :

8. L.V. COIL CONSTRUCTION DETAILS :

(a) Type of Winding(copper) :

(b) Type, Number and Size of bare conductor. :

(c) Size of insulated conductor :

(d) Cross sectional area of bare conductor (sq.mm.)

(i) Gross :

(ii) Net As per IS:6160 :

(e) No. of coils per limb :

(f) Outer diameter of coil (mm) :

(g) Inner Diameter of Coil (mm) :

(h) Mean Diameter of Coil (mm) :

(i) Insulation of Conductor :

(j) Inter layer reinforcement details :

(k) Current at full load (Amp) :

(l) Current density as per your design (A/mm^2) :

(m) End turn insulation :

(n) Weight of bare conductor used in one leg of LV (kg) :

(o) Weight of insulated conductor used in one leg of LV (kg.) :

(p) No. of turns per leg :

(q) Length of mean turns (mm) :

(r) Resistance of winding (with ±5% tolerance)

a) at 20 °C (Ohms) :

b) at 75 °C (Ohms) :

(s) I^2R at 75ºC :

(t) Axial Length (mm) :

(u) Weight of oil soaked coil in one leg :

9. INSULATION DETAILS MATERIAL AND SIZE

(a) H.V. Coil end packing :

(b) L.V. coil end packing :

(c) Inter coil spacer of HT sections :

(d) Bottom yoke strip insulation at foot plate :

(e) Yoke Insulation :

(f) Clamp Insulation :

(g) Inter Phase Barrier :

(h) Core Wrap :

(i) Cylindrical Insulation Between H.T. & L.T. :

(j) Type of blocks used in between coils :

(k) Weight of total insulating material in one T/F (oil soaked). :

(Enclose calculation of losses with complete details of factors assumed)

10. **DETAILS OF CLEARNACES (mm)**

(a) Internal clearance between inner walls of Tank & core coil assembly unit

(i) On length(Bushing side) :

(ii) On Breadth Side(Non bushing side) :

(b) Radial clearance between H.V. & L.V. Winding :

(c) Phase of phase clearance between H.V. Limb :

(d) Clearance from top of the live part of top changer to the inside of the top cover of the tank. :

(e) Radial clearance of L.V. coil from core. :

(f) Minimum clearance between LV Pole to earth)

(g) Horizontal duct between H.T. Section coil :

(h) End clearance of H.T. coil from Yoke (With angle shaped windings) :

(i) Minimum clearance between core & tank bottom.

(j) Angular ducts between LT & HT winding.

Note: **Above clearances include the thickness of insulation.**

11. **IMPULSE TEST VOLTAGE OF WINDING FOR 1.2/50 M.S. WAVE ACCORDING TO RELEVANT ISS :**

(a) H.V. (KVP) :

(b) L.V. (KVP) :

12. Volts per coil of H.V. Winding (Volts) :

13. Approximate volts per layer of H.V. winding (Volts) :

14. Performance reference temperature (ºC) :

15. Core loss in watts (Guaranteed value without any positive tolerance) (Watts)

a) Normal Voltage :

b) Maximum Voltage :

16. Full Load losses at 75 ºC (Watts) :

(Guaranteed value without any positive tolerance)

17. Load loss at 50% load & at 75 ºC :
(Guaranteed value without any positive tolerance)

18. Total Losses at 100% load at 75 ºC (Watts) :
(Guaranteed value without any positive tolerance)

19. Total losses at 50% load at 75 ºC :
(Guaranteed value without any positive tolerance)

20. Magnetising (No Load) Current at

a) 90% Voltage :

b) 100% Voltage :

c) 110% Voltage :

21. Regulation at normal full load and

a) Unity P.F. and :

b) 0.8 P.F. :

22. Impedance voltage at rated voltage & frequency at 75ºC. :

23. Percentage reactance at rated voltage & frequency at 75ºC. :

24. Percentage resistance at 75ºC. :

25. **PERCENTAGE IMPEDANCE AT 75ºC.**

(a) With respect to high voltage :

(b) With respect to low voltage :

26. Un-balance current as percentage of full load current :

27. **Efficiency at 75 °C**

a) Unity P.F. and :

b) 0.8 P.F.

i) 125% load :

ii) 100% load :

iii) 75% load :

iv) 50% load :

v) 25% load :

28. Permissible duration of overload following Continuous running at normal rated load in Ambient temperature of 50ºC.

(a) 10% overload :

(b) 20% overload :

(c) 30% overload :

29. RMS value of symmetrical short circuit current which the transformer can withstand and its duration according to clause 9.1 of ISS:2026 or CL:1001 of BSS with latest amendment thereof. :

30. Increase in temperature of winding at full load by resistance method in an ambient temperature of 50ºC. :

31. Increase in temperature of oil by thermometer at full load in an ambient temperature of 50ºC. :

32. Temperature of hottest spot in the winding at full load in an ambient temperature of 50ºC. :

33. Terminal arrangement of H.V. side :

34. Terminal arrangement of L.V. side :

35. **PARTICULARS OF H.V. BUSHING** :

(a) Name of Manufacturer :

(b) Type :

(c) Confirming to ISS :

(d) Dry withstand voltage for one minute :

(e) Wet withstand voltage for 30 minutes :

(f) Voltage rating :

(g) Impulse withstand voltage
1/50 μ sec. wave :

(i) Positive :

(ii) Negative :

(h) Total creepage distance in air (mm) :

(i) Height of bushing above transformer tank. :

(j) Material & Size of HV terminal spends.

36. **PARTICULARS OF L.V./ NEUTRAL BUSHING :**

(a) Name of Manufacturer :

(b) Type :

(c) Confirming to ISS :

(d) Voltage rating :

(e) Dry withstand voltage for 1 minute :

(f) Wet Withstand voltage for 30 min. :

(g) Total creepage distance in air (mm) :

(h) Material and Size of LT terminal studs :

37. Time constant of transformer :

38. Radiation

i) Heat dissipation by tank walls (excluding top & bottom) :

ii) Heat dissipation by cooling tubes :

iii) Diameter and thickness of cooling Tubes :

iv) Whether calculation sheet for selecting cooling area to ensure that the transformer is capable of giving continuous rated output without exceeding temperature rise is enclosed. :

39. **TRANSFORMER OIL**

(a) Grade of Oil :

(b) Dielectric strength :

(c) Resistivity :

(d) Acidity :

(e) Tan Delta :

(f) Name of Supplier (only reputed make shall be accepted) :

40. **Quantity of transformer oil**

a) First filling :

b) Drained out :

41. **WEIGHT OF THE FOLLOWING**

(a) Tank & Fitting (Kg) :

(b) Core coil assembly (Kg) :

(c) All HV & LV coil (Kg) :

(d) Core stampings(only) (Kg) :

(e) Transformer oil (Kg) :

(f) Total weight of transformer including oil (Kg.) :

42. **OVERALL DIMENSIONS OF TRANSFORMER**

(a) Length (mm) :

(b) Breadth (mm) :

(c) Height (mm) :

43. Conservator dimensions :

44. Name of material, number, weight and size used for clamping of core & winding :

(a) Core Clamp :

(b) Tie Rod :

(c) Core Bolt :

(d) Bottom Foot Plate :

45. Line lead support details

46. Silica Gel breather size:

47. Clearance in air between :

(a) Phase to Phase (HV Side) :

(b) Phase to Earth (HV Side) :

(c) Phase to Phase (LV) side

(d) Phase to Earth (LV Side) :

48. Type Testing:

(a) Is the offered 11/0.4 KV Conventional Type (3 Star rated) Distribution Transformer type tested? :

(b) If yes, when and where it was Type Tested? :

(b) Is there any deviation in the technical specifications of offered transformer, if yes give details :

(c) Details of type test reports:

	Name of test	Date of test	Whether test report enclosed or not (Y/N)	If yes no. of sheets enclosed
1	Impulse voltage withstand test at 95 KVP			
2	Temperature rise test			
3	Short circuit withstand test: Thermal and dynamic ability.			
4	Magnetic Balance Test.			

5	Air Pressure Test: As per IS – 1180.			
6	Noise-level measurement.			
7	Un-balanced current test:			
8	Measurement of zero-phase sequence impedance.			
9	Measurement of Harmonics of no-load current			

49. Whether you will use specified Aluminium alloy or brass/ copper with suitable bimetallic arrangement for HV/LV connector? Yes/No

50. Have you submitted drawings and calculations of cross sectional area of core? Yes/No

51. Have you submitted calculation for computation of losses 100% and 50% load at 75 deg. C. as per design data of offered transformer? Yes/No

52. Whether the name plate gives all particulars As required in tender? : Yes/No

53. Whether the offer confirms to the limits of Temperature rise mentioned in the specification : Yes/No

IMPORTANT NOTES :

(1) CROSS SECTIONAL AREA OF CORE IS TO BE SUBSTANTIATED BY DRAWINGS AND CALCULATIONS.

(2) MAXIMUM FLUX DENSITY AT RATED VOLTAGE AND FREQUENCY IS TO BE SUPPORTED BY CALCULATIONS.

(3) WEIGHT OF STAMPINGS IN CORE ASSEMBILY MUST BE SUBSTANTIATED BY CALCULATIONS.

(4) COMPUTATION OF NO LOAD CURRENT AT 90%, 100% AND 110.0% MAY BE SUPPORTED BY CALCULATIONS.

(5) COMPUTATION OF NO LOAD AND FULL LOAD LOSS AT 75 DEG.C. MAY BE SUPPORTED BY CALCULATIONS.

(6) DETAILS OF CLEARANCES AS GIVEN IN CLAUSE: 11 INCLUDE THICKNESS OF.

SCHEDULE IB

ADDITIONAL DETAILS

Sl. No.	Description	
1.	Core Grade	
2.	Core diameter	mm
3.	Gross core area	sq cm
4.	Net core area	sq cm
5.	Flux density	Tesla
6.	Mass of core	kg
7.	Loss per kg core at the specified flux density	watt
8.	Core window height	mm
9.	Center to center distance o the core	mm
10.	No. of LV Turns	
11.	No. of HV Turns	
12.	Size of LV conductor bare/covered	mm
13.	Size of HV conductor bare/covered	mm
14.	No. of parallels	
15.	Current density of LV winding	A/sq mm.
16.	Current density of HV winding	A/sq mm.
17.	Wt. of the winding for Transformer	kg
18.	Wt. of the HV winging of Transformer	kg
19.	No. of LV Coils/phase	
20.	No. of HV Coils/phase	
21.	Height of LV Windings	mm
22.	Height of HV Windings	mm
23.	ID/OD of HV winding	mm
24.	ID/OD of LV winding	mm
25.	Size of the duct in LV winding	mm
26.	Size of the duct in HV winding	mm
27.	Size of the duct between HV and LV	mm
28.	HV winding to tank LV winding clearance	mm
29.	HV winding to tank clearance	mm
30.	Calculated impedance	%
31.	HV to earth creepage distance	mm
32	LV to earth creepage distance	mm