

**SCHEDULE OF GUARANTEED TECHNICAL PARTICULARS FOR 33/11KV 10  
MVA, TRANSFORMERS**

1.	Name of Manufacturer	
2.	Type of Transformer	
3.	<b>Rating</b>	
a.	Rated output (MVA)	
b.	Rated Voltage of HV&LV (KV)	
c.	Rated Current of HV&LV (A)	
d.	No load Voltage ratio	
e.	No. of Phases	
f.	Rated frequency	
4.	<b>Connections</b>	
a.	High Voltage	
b.	Low Voltage	
c.	Vector Group Symbol	
5.	<b>Cooling Arrangement</b>	
a.	Type of cooling	
b.	Number of Cooling tubes / fins per radiator and number of radiators	
c.	Size of radiator fins	
d.	Thickness of sheet	
e.	Horizontal distance between radiators	
f.	Vertical distance between Core center line and radiator center line	
6.	<b>Dimension of inside of tank (mm)</b>	
a.	Length	
b.	Breadth	
c.	Height	
d.	Weight of tank without fitting	
7.	<b>Thickness of transformer tank Plate (mm)</b>	
a.	Sides	
b.	Bottom	
c.	Cover	
8.	<b>Overall Dimension of Tank with Fittings (mm)</b>	
a.	Length	
b.	Breadth	
c.	Height	
9.	<b>Details of Oil</b>	
a.	Standards of Oil	
b.	Quantity of Oil (Ltr. and Kg.)	
10.	<b>Details of Core</b>	
a.	Material of core lamination & Grade	
b.	Thickness of core plates	
c.	Insulation of Core lamination	
d.	Window Height	
e.	Leg Center	
f.	Core Diameter (approx.) (mm)	
g.	Core cross sectional area (gross) (mm <sup>2</sup> )	
h.	Core cross sectional area (net) (mm <sup>2</sup> )	
i.	Maximum flux density in core at normal voltage, frequency and ratio	
j.	Weight of stamping in core and yoke separately in	

	Kgs.	
	i) Core	
	ii) Yoke	
i.	Size and No. of clamping channels	
ii	Weight of clamping channels with stiffeners	
k.	Size & number of tie rod (if used)	
l.	Size & number of core bolt	

**(Note: Please enclose details of core-steps, its drawing and flux density, weight of core, fittings, copper, oil, Off Load Tap Changer separately).**

11.	<b>Weight of transformer</b>		
a.	Weight of core only		
b.	Weight of core assembly excluding HV & LV coils		
c.	Weight of Transformer oil		
d.	Weight of insulated conductor in HV		
e.	Weight of insulated conductor in LV		
f.	Tank and fitting (Kgs.)		
g.	Total weight of transformer with oil		
12.	<b>Details of Winding</b>	<b>HV</b>	<b>LV</b>
a.	Type of winding and material		
b.	Conductor Size (bare)		
c.	Cross sectional area (mm <sup>2</sup> )		
d.	Type of insulation of conductor		
e.	Size of insulated conductor		
f.	Number of disc / coil per limb		
g.	No. of coils per disc		
h.	Internal dia of coil		
i.	Outer dia of coil		
j.	Axial length		
k.	Mean length of turns (mm)		
l.	No. of turns		
m.	Inter turn insulation		
n.	End turn insulation		
o.	Type of axial coil supports		
p.	Details of end clamping rings		
q.	Whether windings are inter leaved		
r.	Size of cooling ducts		
s.	Weight of bare conductor used in one leg (kg.)		
t.	Weight of insulated conductor used in one leg (kg.)		
u.	Resistance of winding (with 5% tolerance) a) at 20 °C (Ohms) : b) at 75 °C (Ohms)		
v.	I <sup>2</sup> R loss at 75 <sup>0</sup> C (per phase)		
w.	Maximum current density in winding at CMR – Amp./Sq cm.		

**(Note: Enclose calculation of losses with complete details of factor assumed, core & winding details of drawing)**

13.	Thermal time constants – Hrs.	
14.	Terminal arrangement HV side	
15.	Terminal arrangement LV side	
16.	Regulation at full load at 75 <sup>0</sup> C	
a.	At unity power factor	
b.	At 0.8 power factor (lagging)	

17.	<b>Percentage efficiently at normal ratio, rated voltage and at 75°C average winding temp.</b>	
		<b>UPF                      O.8 P.F.</b>
a.	Full Load	
b.	3/4 Full Load	
c.	1/2 Full Load	
d.	1/4 Full Load	
18.	No load current as percentage of full load current at rated volt. and frequency in %	
19.	Power factor and no load current at normal volt. and frequency in %	
20.	<b>RMS value of symmetrical short time current rating as per ISS which the transformer can withstand and its duration</b>	
a.	H.V. Winding	
b.	L.V. Winding	
21.	Maximum out of balance force in winding on short circuit at the terminals	
22.	<b>Clearance between phases in Air (mm)</b>	
a.	H.V. Side	
b.	L.V. Side	
c.	L.V. to Earth	
23.	<b>Clearance in oil (mm)</b>	
a.	Internal clearance between inner walls of Tank & core coil assembly unit	
b.	On length side	
c.	On Breadth Side	
d.	Radial clearance between H.V. & L.V. Winding	
e.	Phase of phase clearance between H.V. Limb	
f.	Radial clearance of L.V. coil from core	
g.	Minimum clearance between LV Pole to earth	
h.	Horizontal duct between H.T. disc	
i.	End clearance of H.T. coil from Yoke (with angle shaped windings)	
j.	Minimum clearance between core & tank bottom	
k.	Angular ducts between LT & HT winding	
24.	<b>Insulation Details</b>	
a.	End spacing of L.V.	
b.	End spacing of H.V.	
c.	L.V. winding to core	
d.	Between HV & LV winding	
e.	Inter phase barrier	
f.	End phase barrier	
25.	<b>Insulation Level</b>	<b>H.V.                      L.V.</b>
a.	Separate source power frequency Volt. Withstand – KV.	
b.	Induced over voltage withstand – KV	
c.	1.2/50µs full wave lighting impulse withstand voltage-KV	
	i) Impulse	
	ii) Power frequency (Dry & Wet)	
d.	Voltage to earth for which the star point will be insulated – KV	
	i) Impulse	
	ii) Power frequency (Dry & Wet)	

26.	Performance reference Temp. (Deg. C)	
27.	Volts per coil of HV winding (Volts)	
28.	Approx. Volts per layer of HV winding (Volts)	
29.	Impedance voltage at rated full load and transformation	
30.	Percentage reactance Ratio at rated voltage & frequency at 75 <sup>0</sup> C.	
31.	Percentage resistance at 75 <sup>0</sup> C	
32.	Impedence voltage at principal tapping and at 75 <sup>0</sup> C average winding temperature expressed as percentage of rated voltage between HJV & LV winding - %	
33.	Permissible duration of over load following continuous running at normal rated load in an ambient Temp. of 50 Deg. C.	
a.	10% overload	
b.	20% overload	
c.	30% overload	
34.	<b>Maximum temperature rise at full load (above max. average ambient Temp. of 45<sup>0</sup>C.)</b>	
a.	Of top oil by thermometer Deg. C.	
b.	Of winding by resistance method Deg. C.	
c.	By hot spot temperature indicator Deg. C.	
35.	Limit of hot spot temperature for which designed – Deg. C.	
36.	Temperature Gradient between winding and oil – Deg. C.	
37.	Maximum No. load loss at rated voltage on principal tapping at rated frequency (Guaranteed without any plus tolerance) (including 25% stray no load loss for considering in-consistencies of B-H characteristics of core material and workmanship).	
38.	Maximum load loss at rated current on principal tapping at 75 <sup>0</sup> C. (Guaranteed without any plus tolerance) including 10% stray load loss)	
39.	Resistance voltage drop at rated current for principal tapping at 75 <sup>0</sup> C average winding temperature as percent of rated voltage - %	
40.	Reactance voltage drop expressed as percent for rated voltage - %	
41.	<b>Temperature indictors</b>	<b><u>Oil Temp Ind.</u> <u>Winding Tem. Ind.</u></b>
a.	Make and Type	
b.	Permissible setting ranges for alarm & trip.	
c.	No. of contacts	
d.	Current rating of each contact.	
42.	Gas and oil actuated relay description data & range of settings, schematic diagram etc.	
43.	Type of pressure relief device & pressure at which it operates.	
44.	Details of magnetic oil gauge	
45.	Weight of silica gel (Grm.)	
46.	<b>Particular of Bushings</b>	<b>H.V. L.V.</b>
a.	Name of manufacturer	
b.	Type	
c.	Voltage rating – KV	

d.	Visible power frequency voltage discharge test – KV	
e.	Dry power frequency withstand voltage for one minute	
f.	Wet power frequency withstand voltage for 30 minutes	
g.	Dry standard lightning impulse with stand volt-KV	
h.	Creepage distance in air (mm) (protected and total)	
i.	Recommended Gap setting – mm	
j.	Weight of assembled bushing KG	
47.	Free space required at the top for removal of bushing – mm	
48.	Minimum clearance height for lifting core & windings from tank	
49.	Details of Off load tap changer	
a.	Make	
b.		
c.	Rating	
	i) Rated voltage	
	ii) Rated current	
	iii) step voltage	
	iv) No. of steps.	
50.	<b>Shipping details</b>	
a.	Parts detached for transport	
b.	Approx. Weight of heaviest package – kg.	
c.	Approx. dimension of larges package-mm	
	i) Length	
	ii) Breadth	
	iii) Height	
51.	<b>Type Testing</b>	
a.	Whether the transformer of the offered design has been type tested during last 5 years from the date of opening of tender?	
b.	If yes, when and where was it type tested?	
c.	Is there any deviation in the technical specification of offered 8MVA, 33/11 KV, power transformer?	
52.	Details of test reports	

Sl. No.	Name of Test	Date of Test	Whether test reports enclosed or not (Yes / No)	If yes no. of sheets.
1.	Temperature Rise Test			
2.	Vacuum Test			
3.	Pressure Test			
4.	Impulse Voltage with stand test (lightning Impulse Test)			
5.	Short Circuit Test			
6.	Thermal ability Test			
7.	Zero sequence Impedance Test			

Note: All bidders are required to give quantity of materials / equipment used in T/F alongwith costing details (cost analysis)