shall be provided in RTCC Panel. Over load and single phase protection shall be provided but no volt release shall not be fitted. A single phase preventor should be installed on the main supply to cooler circuit so that in case of single phasing all the three phases are put off, thus, preventing single phasing. A single metal clad main isolating switch with H.R.C. fuses shall be provided for the main supply.

The switching in or out of cooling equipment shall be controlled by temperature indicators and there shall be provision for automatic switching in or out at pre-determined temperature level which should be capable of adjustment and setting at will. The cooler control scheme shall be so designed that :-

a) it shall be possible to run all fans, including stand-by fans, on manual
b) there should be provision to change over any fan to stand-by

The tenderer shall specify the loading capacity of the transformers in case of failure of one or more sets of fans. Provisions should be made to avoid hunting of fans.

A complete remote control equipment of coolers and the equipment for remote control of ON Load Tap changer shall be supplied by the tenderer for installation in the control room.

20. INSULATING OIL:

i) The TRANSFORMER Insulating oil used for the Transformer Testing during Manufacturing and inspection by PSTCL at the works of the firm shall be of Napthenic base. The inspector can take a sample and test it for its Naphthenic base characteristics.

ii) Sufficient insulating oil of NAPTHENIC TYPE (made from NAPTHENIC CRUDE) conforming to BS:148/IEC:296 class-1/PSTCL SPEC. shall be supplied for first filling of each transformer.

iii) 5% extra oil of the total quantity of oil shall also be supplied.

iv) Particular attention shall be paid to deliver the oil at site free from moisture and of uniform quality through out in non-returnable epoxy coated steel drums.

v) The quantity of oil for first filling of each transformer shall be stated in tender, alongwith trade mark of the oil to be supplied.

vi) Use of inhibitors in oil shall not be resorted to.

21. SUPRESSION OF HARMONICS:

The transformer shall be designed with particular attention to suppression of harmonic voltages especially the 3rd. and 5th. Percentage of harmonics at normal voltage and at maximum system voltage shall be stated in the tender. Harmonics shall be measured during final testing of the transformer.

22. TANK: (BELL TYPE DESIGN):

The transformer tank and cover shall be oil tight and shall be fabricated from good commercial grade low carbon steel of adequate thickness. The weld procedure and performance shall be in line with

SECTION –VII

SCHEDULE OF GUARANTEED CHARACTERISTICS OF NEW TRANSFORMER OIL (IN DRUMS)

Sr. No.	Characteristics	Requirements
1.	Appearance	Oil shall be clear & colorless (approx.) & transparent & free from suspended matter or sediments.
2.	Density at 29.5 deg.C (Max)	0.89 g/cm3
3.	Kinematic viscosity at 20 deg.C (Max)	40 CST
4.	Interfacial tension at 27 deg.C (Min)	0.04 N/M
5.	Flash Point (Min)	148 deg.C.
6.	Pour point (Max)	-30 deg.C.
7.	Neutralisation value	
	a) Total acidity (Max).	0.03 mg KOH/g.
	b) Inorganic acidity/ alkalinity	Nil
8.	Corrosive Sulphur	Non-corrosive
9.	Electric strength (Break down voltage) Min.	
	a) New unfiltered Oil	30 KV (rms) (Min.)
	b) After filteration	If the above value is not obtained the oil shall be filtered 60 KV (rms) (Min).
10.	Dielectric dissipation factor (Tan-delta) at 90 deg.C.	0.002 (Max)
11.	SK value (Max)	4-8 %
12.	Water content (Max).	50 PPM
13.	Specific resistance (resistivity)	
	a) At 90 deg.C (Min.)	150×10^{12} ohm-cm
	b) At 27deg. C (Min.)	2500×10^{12} ohm-cm
14.	Oxidation stability (after oxidation for 164 Hours @ 100 Deg.C).	
a.	Neutralisation value after oxidation (Max.).	0.40 mg KOH/g.
b.	Total sludge after oxidation (Max.)	0.10% by weight.
15.	Ageing characteristics after accelerated ageing (open beaker method with copper	

	catalyst) 96 Hours @ 115 Deg. C.	
a.	Specific resistance (resistivity)	
	i) AT 27 deg.C (Min)	2.5 x 10^{12} ohm-cm
	ii) AT 90 deg. C (Min)	0.2 x 10^{12} ohm-cm
b.	Dielectric dissipation factor (Tan delta) at 90 deg.C.	0.20 Max.
c.	Total acidity mg KOH/g	0.05 Max.
d.	Total sludge value percent by weight.	0.05 Max.
16.	PNA Component analysis	N- More than 46% (Napthenic) P- Less than 46% (Paraffinic) A- Less than 8% (Aromatic)
17.	Presence of oxidation inhibitor	Absent