# TAN-DELTA TEST SETS

## Why to measure the CAPACITANCE & TAN-DELTA of the insulating material?

Electrical properties of the insulating system change due to age and continuous electrical street. The principal contributor to the unexpected breakdown of the high voltage equipment is the insulation failure. As compared to the magnetic, conducting & insulating materials which form the basics of any electrical equipment, the insulating material is more prone to service stresses like thermal stress, electrical stress, mechanicals stress, environment stress etc.

By measuring the electrical properties such as capacitance and Tan-Delta regularly on periodical basis, it is possible to ensure the operational unexpected breakdown. Dissipation factor (Tan-Delta) is one of the most powerful off-line nondestructive diagnostic tool to monitor the condition of solid insulation of various high voltage equipment.

Capacitance and Tan-Delta values obtained on new insulation are treated as benchmark readings. Then by measuring and comparing the periodical readings of the capacitance and Tan-Delta of the insulating material with the benchmark readings, one can know the rate of deterioration of the health of the insulation.

## Knowing the rate of deterioration, we can be able to

- Predict the future unexpected breakdown of the insulation of HV equipment.
- Plan the maintenance schedule.
- Repair the insulation before actual flashover, saving high cost of replacement of material which will reduce the inventory well as delay in procurement at the last minute.
- After repair, quality of insulation can be checked before returning the equipment to service.

## When to check capacitance & Tan-Delta

- During manufacturing process preferably at each stage.
- In service & will be depend on rate of change of Tan-Delta Vs Voltage Vs Time (Month/Year).
- Frequency of testing depends on history of past failures on same machine.
- Frequency of testing depends on environmental conditions. More humidity, temperature, pollution would require frequency measurement of Tan-Delta.

# CAPACITANCE & TAN-DELTA TEST SYSTEM (MODEL TD-1)

The instrument after some minor calculation directly gives the capacitance and dissipation factor (Tan-Delta) of the insulating material when used with the required power source. This is a battery operated instrument and very useful to monitor the insulation health of the insulating material as per IS. This instrument is specially shielded with high permeability metal sheets to avoid the effect of external interference.

## Features :

- Built-in protection : Instrument is provided with built in high voltage protection device which protects the instrument & the operator against failure of test object or standard capacitor.
- Null Detector : Built-in battery operated null detector is provided which is most suitable for quick balancing of the instrument. It gives high sensitivity and accuracy.
- ICU : Interference compensation (unit) is useful only in the case of heavy induction area so the to get the correct readings.


## Technical specification :

- **Capacitance Range :** 1 PF to 1.1MFD in three or four ranges depend upon capacitor and can be extended further (using external current transformer).
- **Resolution** **: Cx multiplying factor** **Resolution**

| | |
|---|---|
| 0.01 | 0.1 PF |
| 0.1 | 1 PF |
| 1 | 10 PF |
| 10 | 100 PF |

- **Accuracy** **:** ± 0.1% of reading.
- **Tan-Delta Range** **:** 0.0001 to 11.1 in three ranges.
- **Resolution** **: Tan-Delta factor** **Resolution**

| | |
|---|---|
| 0.1 | $1 \times 10^{-5}$ |
| 1 | $1 \times 10^{-4}$ |
| 10 | $1 \times 10^{-3}$ |

- **Accuracy** **:** ± 1% of reading ± 1 to 2 x 10 -4.

# HIGH VOLTAGE POWER SOURCE (MODEL H-12)

The instrument is used to get the high voltage 0 to 12 KV/100mA as output from the 230VAC input. This is provided with built-in SF6 gas filled standard capacitor and useful for both grounded as well as ungrounded objects. Higher KV and current capacity power supply can be provided as per the requirements.

## Features :

- Zero start control, external interlock, open ground indicating lamp, HT cut-off on overload.
  **Instrument can be used in three different modes.**
- **UST (Ungrounded specimen test):**
  Used when the object under test is not grounded. This mode provides most accurate results.
- **GST (Grounded specimen test):**
  Used when the object under test is permanently grounded. This mode often used for outdoor installed power systems.
- **GSTg (Grounded specimen test with guard):**
  Used to measure the stray capacitances and separating them from basic measurement in GST mode.


## Technical Specification :

- **Test Voltage** : 0 to 10Kv / 50Hz.
- **Rated Power** : 1 KVA maximum.
- **Rated Current** : 100mA (long term) current capacity.
- **Power Required** : 230V AC ± 10% / 50Hz.
- **Standard Capacitor** : Capacitor is compressed with SF6 gas.
- **Capacitance** : 100 pf ± 5% or actual value.
- **Tan-Delta** : Less than 0.00001
- **Dielectric** : SF6 gas
- **Test Voltage** : up to 12 KV RMS Max.
- **Voltage** : 14 KV RMS (1 minute)
- **Voltage Indication** : 3 ½ digit DPM
- **Size** : 510 x 550 x 590mm.