

# CTT series

## Cable Test Termination System



**CTT-700**

### Application

CTT series cable test terminations are used to test Plastic insulated high-voltage cables. The specific advantages of this series versus conventional terminations are fast and convenient assembly. The terminations can be used for partial discharge (PD) measurements, impulse voltage testing, loss factor (tan delta) measurements and, if the cable ends are carefully prepared, for breakdown testing (step test).

When a cable is being tested, the PD measurement can be followed by an impulse voltage test and by another PD measurement without the need to reconfigure the test arrangement. A loss factor measurement can be made with minor modifications to the arrangement.

The cable is prepared in the same way as for slip-on terminations i.e. by stripping the cable to the outer semi conducting layer and removing the outer semi conducting layer.

The CTT series includes terminations from 75 kV to 800 kV for a maximum cable diameter of 165 mm over the outer semi conducting layer.

### PD and tan delta Measurement

Since the CTT series is free of partial discharge, the PD measurement can be performed up to the rated voltage of the terminations.

The SAMGOR (SG4003) PD measurement system can also be used for locating partial discharges in cables.

The tan delta measurement on plastic-insulated cables poses great demands on measurement techniques due to the extremely low loss factor values.

### Impulse Voltage Testing

Water of greater conductivity is used for impulse voltage testing to achieve homogeneous voltage distribution along the terminations for transient voltages. This keeps the total resistance of the termination relatively low (approx. 5 k $\Omega$ ). The half-value decay time of the impulse voltage can be maintained to within normal cable testing tolerances if the impulse system is tuned to the terminations (50  $\pm$  10  $\mu$ s to IEC Pub 230; SEN 2103; IS 2070-1962; VDE 0472, Part 511), GBT3048.13-2007.

### Breakdown Testing

The following factors must be considered when breakdown tests are performed. The removal of the outer semi conducting layer basically weakens the insulation on the cable ends. This procedure must be carried out with the utmost care to keep this weakening effect within acceptable limits. However, a breakdown of the cable in the termination tubes and the associated damage to them cannot be completely excluded.

The probability of a cable breakdown in the termination increases with decreasing cable length and increasing cable quality. One of the reasons is that, despite optimized field control, the field strength in the termination is much higher than in the coaxial cylindrical field of the cable. CTT cable test termination has developed special insertion electrodes to ensure the best possible field control for breakdown tests. Breakdown tests on medium voltage cables using CTT series terminations can be successfully carried out when these electrodes are used.

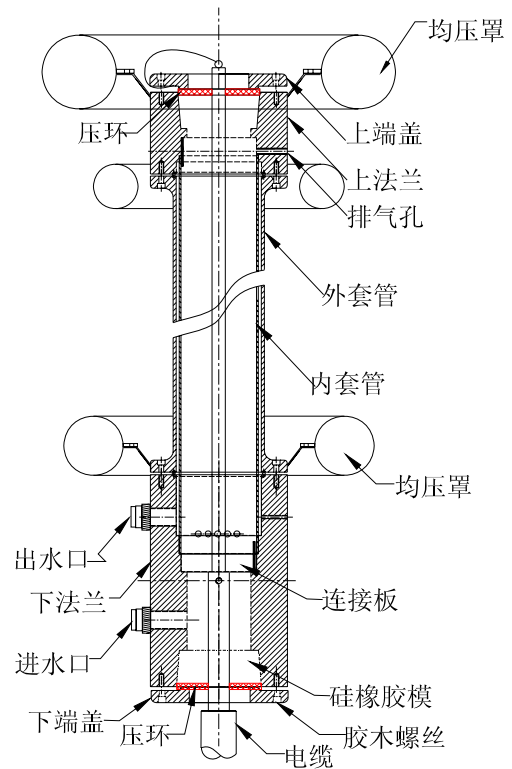


Fig. 1

## General Arrangement of the Termination System

The terminations consist of a 2-tube system in which the water circulates (Fig. 1). A closed system is formed when the water conditioning unit is connected (Fig. 2).

After the terminations have been connected to the water conditioning unit by 4 hoses, the termination system operation states can be selected by pushing the respective buttons. It is not necessary to manually actuate any valves.

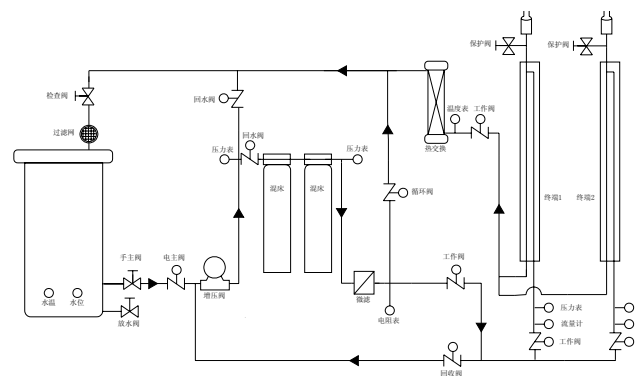
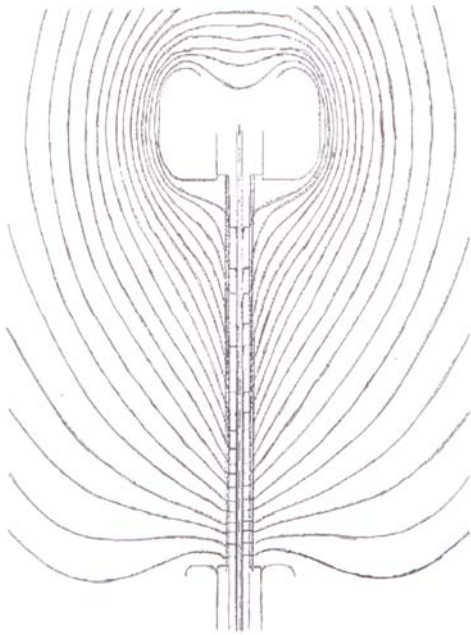


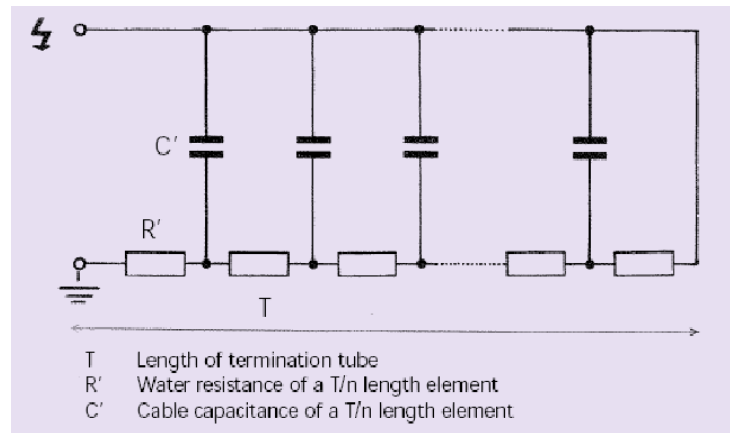
Fig. 2

CTT series terminations are designed for indoor use. Each termination is mounted on its own trolley.

## Function



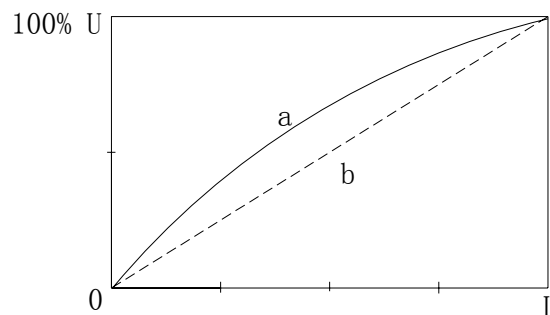
Typical test termination field distribution



Equivalent circuit diagram of a CTT test termination

The cylinder field of the cable changes in the termination. The aim of the termination is to attain a close approximation to the cylinder field of the cable in this zone. The approximation to a cylinder field is particularly important, due to the higher field strengths compared to the operating field strengths of the cable to be tested.

The CTT series terminations are distinguished by outstanding field control in this zone. Typical test termination field distribution shows the typical field of a CTT series termination. This field exhibits a substantially linear potential drop along the tube of the termination. The reason for this is the resistive (water) and capacitive (cable) arrangement of the termination.



This was calculated using the iterative network equivalent circuit diagram. A substantially linear field distribution is aimed when the termination is in operation. The distribution is dependent on the system geometry and the cable to be tested.

## Technical Data

	CTT-150	CTT-300	CTT-400	CTT-600	CTT-700
Un Rated voltage [kV]	150 r.m.s	300 r.m.s	400 r.m.s	600 r.m.s	700 r.m.s
PD(Un ) [pC]	<1	<1	<2	<2	<2
UI Rated impulse voltage [kV]	-550 peak	-900 peak	-1200 peak	-1400 peak	-1650 peak
Max cable dia. across outer semi-conducting layer[mm]	133	133	133	133	160
Elevated elevation[°]	30	35	35	40	45
Dimensions [m] L x W	1.8 x 1.2	3.0 x 1.2	3.6 x 1.2	4.7 x 1.2	5.8 x 1.4
Cable installation height[m]	1.0	1.0	1.4	1.6	1.6
Terminal installation height [m]	1.9	2.8	3.7	5.0	5.5
Min safety clearance [m]	1.0	1.6	1.9	2.6	3.3
Weight of 2 units without water [kg]	250	350	400	500	650
Water conditioning power [kW] 220V,50Hz	60	60	60	120	120
Water capacity [L]	500	500	500	500	500
Max temperature [°C]	60	60	60	60	60
Max pressure [atm]	4	4	4	4	4
Electric conductivity control range [μs /cm]	0.1—2	0.1—2	0.1—2	0.1—2	0.1—2
Max ambient temperature [°C]	35	35	35	35	35
Min ambient temperature [°C]	3	3	3	3	3
Max cooling water temperature[°C]	20	20	20	20	20
Min cooling water flow velocity [L/min]	45	45	45	45	45
Connect water pipe [inch]	1"	1"	1"	1"	1"
Dimensions [m]	1.2x1.4x1.7	1.2x1.4x1.7	1.2x1.4x1.7	1.2x1.4x1.7	1.2x1.4x1.7
Weight without water[kg]	272	272	272	272	272
Power 50/60Hz	220V/20A	220V/20A	220V/20A	220V/20A	220V/20A

**For further information please contact:**

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