

CTERP -2000 – Some Questions and Answers

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1) *Measurement of Core loss and Core Loss PF*

Q- The losses in a CT will vary between manufacturer to manufacturer and for different type of CTs .

Ans- YES .That is correct. The loss is dependent on the quality and quantity of core material in the CT.

Q- Core Loss PF – The higher the Core Loss PF (i.e nearer to unity) it is more likely that there are shorted turns on the CT core –which reflects in the higher PF.

Ans- The typical “Core Loss Power Factor” should be in the range of 0.05 .. 0.3. High quality (nickel steels) will have a low power factor, while grain oriented silicon steel will have power factors in the range of – 0.15. . 0.3. Power factors higher than this would typically indicate other problems with the core or the windings. Problems with the core would be shorted laminations, problems with winding - shorted turns.

Q- Why is the core loss PF different when we test the same CT for different type of tests .i.e IEC Test and ANSI Tests.

Ans- The core loss does vary as the square of the magnetizing current or the square of the voltage (volt-seconds). The loss is presented at the highest test current, which may not be the same for all tests (the test is NOT CONTINUOUS as the readings are taken at some pre-scribed intervals – like 100 microseconds) as it is impossible to take readings at exactly the prescribed current value (the reading at 0.1234 seconds is too low a reading at 0.1235 seconds which is too high).

The POWER FACTOR typically should not vary very much with small changes in the test current. The CTERP converts values to 50 or to 60 Hz, regardless of the test - IEC – ANSI. It does a 50Hz ANSI test.

Q- Eddy Current Loss – You have indicated that Eddy Currents are caused due to shorted turns on the winding or shorted turns due to defects in mounting.

Ans- Shorted turns can be caused by - actual shorting of the turns, . . . by shorting of laminations due to poor coating on laminations, . . or by shorting of mounting clamps – such as used on bushing CTs. BUT as you typically have three or more samples, and if one sample reads high on eddy-current loss, then you should have a strong suspicion about shorter turns .

Q- Shorted turns may arise over a period of time due to various reasons

Ans YES .

Q- Defective mounting – When the CTs are already mounted inside equipment, how can this happen ?

Ans- This typically refers to CTs mounted on bushings. Such mounting arrangements typically involve flanges and mounting bolts that are insulated from each other. If this insulation fails - it will cause a one-turn short of the CT.

Q- As indicated in the various write-ups and ANSI Std., the accuracy class in ANSI is specified as 2.5C400 , 10C400 etc . ANSI Std. has only one ALF – i.e 20 (The second term in ANSI Acc class - indicates the sec voltage that can be delivered by the winding at 20 times rated sec current w/o exceeding 10% ratio correction).

Ans- Close - but not a thumb rule . The term after the “C” (Calculated) refers to the voltage developed across the “rated burden”. The CTERP identifies only the 2.5% class of CTs. The reason for this is that there is hardly any difference between the 2.5% class and the 10% class, as the CT is already operating above the “knee-point”. Typically there are hardly any “10C” CTs produced, except those of very low ratios.

Q- In our CTERP ANSI Test, the ANSI Acc. Class is always calculated based on excitation voltage when the CT draws 2.5A excitation Current .

Ans- YES, that is correct. This is what the standard calls for. You determine the voltage @ 2.5 amperes excitation, and calculate back what burden this will support at 100 amperes secondary current.

Q- Why this 2.5A ? Is this given anywhere in the ANSI Std. ?

Ans- Because 2.5% of 100 amperes is 2.5 amperes.

Q- Irms value displayed during ANSI test is not varying on different CTs ?

Ans- NO, this is not a variable . ANSI identifies secondary current as 5 amperes, a overload factor of 20 times, this gives a secondary current of 100 amperes, and 2.5% of 100 amperes - gives 2.5 amperes .

Q- In the FULL Test, we have indicated that it allows the operator to limit the magnetizing force & study the core characteristics over a selected region.

Ans- YES, the operator can set different values of “peak excitation” current to study the core material and so on .

Q- The Full Test provides data for the excitation loss and PF at a selected mag. Force (i.e at a particular current) – How is this helpful for a CT manufacturer ??

Ans- It provides numeric values for the core material at the “peak excitation” current. The manufacturer can study and plot loss curves for the core material he is using.

It provides the “rms” characteristics (ac characteristics) and the “peak” characteristics (dc characteristics).

Q- How is the above data /readings helpful to CT designers ?

Ans- One has to “know CTs” for this to be helpful to a user .One can write a whole chapter on this !

Q - Protection CTs that operate at large Accuracy Limiting Factor (ALF) require core material that exhibit high saturation flux density .

Ans- Designers are typically limited to “Grain Oriented Silicon Steel” - or GOSS ...

Q- Rms Current – 15A (in CTERP-5A) and upto 5A (CTERP-1A) . Why is this difference ?

Ans- The CTERP-5A is set for a maximum peak current of about 15 amperes and excites the CT @ 12 volts. The CTERP-1A is set for a maximum excitation current of about 5 amperes and excites the core with 24 volts.

Q- Current Peak – 15A (in CTERP-5A) and upto 10A (CTERP-1A) – Why

Ans- We do not need 15 amperes to excite a 1 ampere CT. Also you can not push 15 amperes through a winding that may be 20 ohms ! The CTERP-5A is set for a maximum peak current of about 15 amperes and excites the CT @ 12 volts. Different CT requirements dictate a differences in the power supplies for the CTERPs.

Q- Why are the secondary leads of a much higher gauge than the primary leads ?

Ans – The CTERP measures the secondary characteristics of the CT. The primary leads are only used to measure the ratio and are not needed to be used if ratio measurement is not required . The secondary leads are used to excite the CT core and carry out the measurement of the Winding Resistance, Insulation resistance and other parameters. These are rated for upto 15A current and so are of a larger cross-section .
