

One Day Seminar on Cast Resin Transformers

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On 22nd March 2017, the IEM Electrical Engineering Technical Division has successfully co-organized the One Day Seminar on Cast Resin Transformers at Hilton Hotel, Petaling Jaya with Ablecon Power System Sdn Bhd and Schneider Electric Industries (M) Sdn Bhd. Approximately 210 participants were present. The event started with a quick run through of the itinerary of the day followed by forewords from Dr. Riyaz Rashid, Electric Vice President for energy business of Schneider Electric. This is followed by the highlight of the day which is the key lecture by Mr. Michel Sacotte, chairman of several IEC 60076 series working group. The key lecture kicked off with a brief introduction on the life cycle of an IEC standards publication. This is followed by highlights of revisions of the IEC 60076-11 which is purely on dry-type transformers which include establishment of link between pollution level, typical environment and environmental classes of transformers, addition of UL requirement as well as consideration of seismic aspect. Correction on applied dielectric test with altitude is another ongoing project of revising IEC 60076 (2004) which will be completed by 2018. The second major topic covered by Mr. Michel was on energy efficiency of power transformers. Power transformer losses constitutes 2.5% of the total European Union energy consumption and reduction of electrical losses is imminent to realize the 20-20-20 programme by EU by 2020.

The Peak Efficiency Index (PEI) can be used to estimate the maximum efficiency of transformer as given by the following equation:

$$PEI = 1 - \frac{2(P_o + P_{cO})}{S_r \sqrt{\frac{P_o + P_{cO}}{P_k}}}$$

Where

P_o : no load losses

P_{cO} : losses of ventilation needed for no load operation

P_k : load losses

S_r : rated power

Mr.Michel then introduced the 3 main kinds of tests as per IEC 17025 standards. Table 1 summarises the 3 tests:

Table 1: Transformers tests

Kind of test	Description
Routine test	To be done by the manufacturer on each individual unit of transformers with the objective to ensure reliability considering the dielectric aspect and the efficiency of transformers.
Type test	To be done on a representative transformers for each kind of type test with the objective to verify the ability of manufacturer to calculate forecasted value.
Special test	To be done for special application, environment or installation as agreed between buyer and manufacturer with the objective to prove that the transformers can withstand special conditions of environment or installation.

The presentation then zoomed into the technology of dry type transformers. In countries with high keraunic level, incorporating surge arrester onto the dry type transformers may be a viable option.

Table 2 illustrates the comparison between dry type and oil type transformers:

Table 2: Dry type and Oil type transformers

Dry type	Oil type
Higher initial product cost	Lower initial product cost
No flammable material such as oil	Special precautions to be taken for fire safety
Lower installation costs	Higher installation costs
Easier maintenance	More complicated maintenance
Lower partial discharges	Higher partial discharges
More suitable for indoor applications	Mostly used for outdoor applications

This is followed by comparison between cast resin, resins and impregnated technologies of dry type transformers at different voltage levels. Mr. Michel also touched on the impact of k-factor on performance of transformers. Transformers losses are categorized in terms of ohmic losses, eddy losses and stray losses. The presence of harmonics signified by the k-factor amplifies the eddy and stray losses. Mr. Michel ended the presentation with a brief introduction on the way forward of dry type transformers.

All in all, the seminar was a success as the participants were actively engaged in asking questions with some senior engineers even sharing their experience via brief comments. The photos below summarize the event as a whole.



More than 200 participants listening intently to the speaker



The organising committee and the speaker