

LOW NOISE POWER TRANSFORMERS

Environmental concern

The last decade, the importance of environment-friendly products has increased significantly. Many people and organizations want to minimize their “ecological footprint” and be gentle with nature and the overall environment. Generally, this is translated into minimizing CO2 production. But another aspect of the environment, which cannot be expressed in tonnes of CO2, is noise. Especially tonal noise – the type of noise produced by a power transformer - which is psychologically even more disturbing.

In many countries, governments have decreased the maximum allowable noiselevels around power stations because of this increasing concern. Utilities, industrial clients and hence transformer manufacturers are facing huge challenges to meet these requirements.

What is noise and what is a decibel

Noise is physically a pressure oscillation in air at a certain frequency. The sound that is audible by a human ear has a frequency between the 20 – 20.000 Hertz. The noise level is usually expressed in decibels (dB), a logarithmic scale; i.e. doubling the sound energy gives an increase of 3dB in sound pressure level. In addition, the sensitivity to sound of the human ear is frequency dependant. That is why audible noise is generally expressed in dB(A). The “A-weighting” is a frequency-dependant correction of the pure dB-value.



Transformer sound sources

The sound of a transformer is produced by 3 sources:

1. Core noise (no-load noise), caused by magnetostriction effects in the steel sheet laminations.
2. Winding noise (load noise), caused by electromagnetic forces in windings
3. Cooling noise, caused by the rotation of cooler fans and pumps.

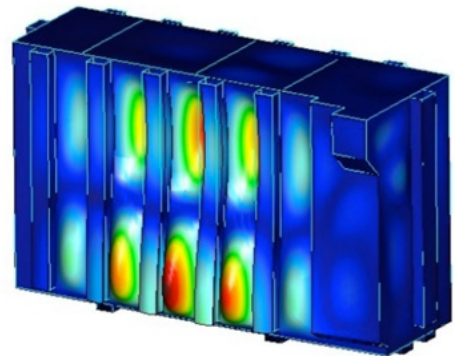
Designing low noise transformers

Cooling noise:

By following the latest trends on the market of cooling equipment, we can offer the quietest range of cooling equipment available, developed by our suppliers.

No-load and load noise: Research & development efforts (the Piano project), initiated in our Belgium plant, have led to more insight in the generation, transmission and radiation of vibration and noise in a transformer. Both by experiments – small scale and full scale – and computer aided simulation, new design formulas and concepts were developed to meet the customer's lowest requirements.

New design features and rules were developed for our designers. In combination with low noise practice, they have a full toolbox of design options to be able to design low noise transformers in an economical way.



Recent achievements

The last few years, we built numerous transformers that had a combined measured sound level between 45 and 50 dB(A) at 0.3m.

The most recent achievement was a successful project for the European market where the noise of an 80MVA 150kV 3-phase transformer was measured below 45dB(A) at 0.3m (full load = no-load + load noise), without external sound panels.

This result was achieved by combining knowhow and new design concepts and optimizations, and is now implemented in our design processes.