5 CONCLUSIONS

Transformer cores can make acoustical noise like humming and rattling. The mechanisms that cause this noise inside the core have been explained. A method has been developed to measure and to scale the acoustic noise of a power transformer under four standardized conditions. They are: nominal mains voltage and mains frequency, 10 % over voltage, 250 mV-DC added and a combination of 10 % over voltage plus 250 mV-DC. The measured acoustical noise is compared to the widely accepted Balanced Noise Criterion curves, thus enabling world wide comparison of noise levels. A noise test chamber is proposed, based on absorbing all reflections and measuring only at the main axis, where the maximum noise level can be expected due to beam forming at high frequencies. Transformers are always mounted in cases, and a emulation of such a case is proposed by means of a steel plate with standardized dimensions. Distance plays an important role, and the distance relations are given for the "far field" condition, which has been verified in the actual noise test chamber, while a one meter distance is proposed as standard unit distance. Four units have been defined for quantifying the noise levels and the conditions of measurement. The tests on four transformers indicate that more attention should be paid to DC-voltage handling capabilities of transformers. The results show as well that the new Plitron LoNo[1] range is able to withstand adverse mains conditions of all the types discussed.

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[1] LoNo is a registered trademark by Plitron Manufacturing Inc.