



Appropriate Sound Pressure Levels for Power Transformer Specifications – How and Why

— Technical Presentation —
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1. Abstract

In most cases, noise levels included in power transformer specifications have a significant impact on the design and, consequently, the cost of the transformer. At the same time, transformer manufacturers have seen some of these specifications require unnecessarily low noise levels while some allow higher noise levels than they should, which often results in noise complaints when these transformers are installed in the field.

This presentation has two parts. In the first part, Dr. Ramsis Girgis will provide an overview of transformer noise and how specified noise levels impact the design and cost of a transformer. In the second part, Mr. Ian Brewe will provide information on methodologies used by substation design engineers to determine the appropriate noise levels of transformers in a substation to satisfy requirements of local and state noise ordinances.

2. Learning Objectives

This presentation plans to:

- Introduce the different components of transformer noise and their frequency spectrum that impact transformer sound propagation
- Outline the impact of specified noise level on the design and cost of a transformer
- Explain how transformer sound propagates, and factors affecting this propagation
- Describe methodologies used by substation design personnel to calculate the impact of power transformer noise on the noise level at the boundary of the substation
- Provide examples of local and state noise ordinance noise requirements

3. Learning Outcomes

As a result of attending this session, participants will gain an understanding of the following:

- Different components of transformer noise and their frequency spectrum
- Impact of specified noise level on the design and cost of a transformer
- How transformer sound propagates, and factors affecting this propagation
- Methodologies used by substation design engineers to calculate the impact of power transformers on the noise level at the boundary of a substation
- Typical noise requirements of local and state noise ordinances

4. Presenters' Biographies

Mr. Ian Brewe is a project manager in the Environmental Services Department at Burns & McDonnell Engineering Company. Ian specializes in managing and performing sound and vibration studies for generation, transmission and distribution projects, transportation and industrial projects. He leads an experienced team of noise specialists who perform noise calculations and modeling, conduct feasibility studies and assist clients with regulatory compliance. Ian received his Bachelor of Science Degree in Applied Mathematics with a Concentration in Physics from Indiana University and is an active member of The Institute of Noise Control Engineering and Acoustical Society of America.

Dr. Ramsis Girgis, IEEE Life Fellow Member, is presently leader of global ABB R&D activities in Power Transformer Technology. He has been an active member of the IEEE Transformers Committee over the past three decades, presently serving as Chair of the TF Audible Sound Revision to Test Code. Dr. Girgis was the technical advisor, representing the US National Committee, in the IEC Power Transformers Technical Committee 14. In 2013, Dr. Girgis was awarded the IEEE Standards Medallion for Significant Contributions to the Transformer Industry and Transformer Standards. Ramsis received his PhD in Electrical Power Engineering from the University of Saskatchewan, Canada.