IEEE PES Transformers Committee
Spring 2020 Meeting
Charlotte, North Carolina USA

Sound Level Specifications of Power Transformers for Compliance, Cost Effectiveness and Clarity

— Technical Presentation —
Thursday, March 26, 2020

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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 specifications require unnecessarily low noise levels and some allow higher noise levels than they should, which often results in noise complaints when these transformers are installed in the field.

This tutorial has two parts. In the first part, Mr. Chris Howell will provide information on methodologies used by substation design engineers to determine appropriate noise levels of transformers in a substation to satisfy requirements of local and state noise ordinances. In the second part, Dr. Ramsis Girgis will provide an overview of transformer noise and how specified noise levels impact the design and cost of a transformer. He will also identify opportunities for improving deficiencies in existing transformer specifications related to transformer noise.

2. Learning Objectives

This tutorial provides the following learning opportunities:

- Introduce the different components of transformer noise and their frequency characteristics that impact transformer sound propagation
- Show the impact of a specified noise level on the design and cost of the 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 and residential areas
- Present examples of noise requirements of local and state noise ordinances
- Present examples of existing noise specifications and identify opportunities for improving deficiencies in these specifications

3. Presenters' Biographies

Dr. Ramsis Girgis (IEEE Life Fellow Member) is presently the leader of global ABB R&D activities in power transformer technology. He has been an active member of the IEEE Transformers Standards Committee over the past four decades and is presently Chairman of the Audible Sound Revision to Test Code Task Force. Previously, he was Chairman of the Performance Characteristics Subcommittee. In the mid-1980s, Dr. Girgis represented the U.S. National Committee in the IEC Power Transformers Technical Committee 14 as a technical advisor. 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 in 1978.

Mr. Chris Howell (Institute of Noise Control Engineering member) is a project manager in the Environmental Services Division at Burns & McDonnell Engineering Company. He manages general environmental permitting teams for generation, transmission and distribution projects as well as leading Burns & McDonnell efforts on noise analyses. Chris' experienced team of technical specialists conduct feasibility studies and assist clients with regulatory compliance and/or mitigation efforts, many of which require public involvement and/or interaction with regulatory agencies. He received his Bachelor of Science Degree in Mechanical Engineering from Kansas State University in 1999.