

Presentation on Transformer

Presentation 1:

Title: Preparation of Transformer Specification

Abstract:

The purpose of this presentation/tutorial is to assist attendees in preparation of Transformer Specifications to procure economical and reliable transformers which meet system needs. By knowing the implications of transformer parameters on operation and on cost, functional specifications can be prepared.

Some of the topics covered in the presentation/tutorial are rating, voltages, transformer type, vector group, loss capitalization, over excitation, insulation levels, cooling type, sound levels, tap range, taps in HV or in LV, operation of taps for input voltage fluctuations or for compensation of regulation, impedance, overloads, short-circuit, accessories, parallel operation, alternatives etc.

Often the bid with the lowest evaluated cost does not give the lowest operational cost transformer, but a good specification is most influential in achieving this. Specifications should not only reduce the capital cost, should also reduce the operational cost. Specifications should help the maintenance and reduce the maintenance cost. To repair a transformer quickly at a low cost should be an important aspect in finalizing an order and to be covered in the specifications.

A clear specification with all system requirements is of at most important in procuring reliable and economical transformers. A specification with no ambiguities and with no missing information avoids manufacturing design engineers to assume the requirements which are not clear or missing. When the manufacturing design engineers have to assume, most likely they will assume to obtain the lowest cost transformer, often this does not meet the system needs.

Presentation 2:

Title: Transformer Design and Design Parameters

Abstract:

The presentation will be on the Basic of Transformer Design. The presentation will explain how a transformer designer interprets parameters such as MVA, lightning Impulse, Switching impulse, Percentage Impedance supplied by a customer. It will touch on Power rating[MVA], Core, Rated voltages, Insulation Coordination, Short-circuit Impedance, Short-circuit Forces, Loss evaluation, Temperature limits, Cooling, Sound Level .. etc. It will also explain overload and life expectancy of a transformer as well when Delta winding is needed in Wye-Wye connection. The presentation will answer why in North America we like to regulate from low voltage side whereas in Europe regulates from high voltage side.

Presentation 3:

Title: TAPS for two winding transformer

Abstract:

The presentation will cover Types of Taps based on function, electrical connection, winding arrangement and tap changer operation; Effect of Taps on first cost and on life cycle cost of the transformer; Different types of tap changers available, their optimum utilization, limitations and maintenance cost; Types of tapping windings and design practices; Guidelines stated in standards, their usage and limitations mainly for two winding transformers.

Presentation 4:

Title: Transformer Manufacturing Processes

Abstract:

The presentation will be on the Industry wide manufacturing process to build a transformer in the shop floor. Processes will cover Core Construction, Insulation, Windings, Core and Coil, Processing, Tanking, Testing and Shipping. Some of the hold-points during the processes will be explained as well what a customer should look into while doing factory inspection. The presentation will also cover reconnection both in LV and HV, LTC Tap changer both in tank and separate tank, Lead works.

Presentation 5:

Title: Fundamentals of Auto Transformer

Abstract:

The fact that Auto-Transformers have weight and overall dimension that is less than 2-winding transformers of the same outputs permits them to be produced with a considerably larger capacity per unit. Auto-Transformers, however, call for several unique design considerations which require special attention and careful study.

This presentation will assist end-users to procure reliable and economical autotransformers. This tutorial will also assist manufacturers, consultants and others to familiarize with various aspects of taps in autotransformers. Different types of taps, their electrical connection and physical location, and their effects on cost and design are discussed in depth. Differences in designs of two winding and autotransformers with taps are illustrated. How to specify the taps in autotransformer procurement specifications is highlighted. Methods to procure autotransformers that meet system needs are suggested. Influence of taps on maintenance and operation are explained.

Presentation 6:

Title: Phase Shifting Transformer fundamentals

Abstract:

Phase shifting transformers are widely used for the control of power flow over parallel transmission lines. Power flow control becomes necessary in today's deregulated power system market, when parallel transmission paths are owned or operated by different operators. PST offers a complete, reliable and more economical solution for the control of power flow as compared to FACTS devices. PSTs are available in unique designs and constructions when compared to the standard power transformers. Moreover, they are among the most expensive transformer kinds in their family.

The presentation explains the fundamentals of phase shifting transformer. It covers detail on symmetrical/asymmetrical, quadrature/non-quadrature, single core, two-core design as well as the limitations of OLTC, testing, manufacturing points and recent developments.

Presentation 7:

Title: Pre-tanking Inspection

Abstract:

The presentation explains how to perform a complete and professional Pre-tanking Inspection. Due to factors such as steep competition, price pressure, globalization, higher failure rate, quality issue many end users adopted “Pre-tanking Inspection” as quality assurance item in their transformer procurement procedure. There is no standard or procedure on how a Pre-tanking Inspection should be done. Many end users created their own version of procedure or checklist to force the inspector to perform the inspection to meet the users’ quality assurance expectation.

Pre-tanking Inspection is not limited to standing in front of transformer for half hour and taking pictures of the transformer. Inspectors’ knowledge about transformer design and ability to indicate inadequate design, unacceptable quality, or inappropriate manufacturing is the key to carry out a professional Pre-tanking inspection.

Presentation 8:

Title: Factory Acceptance Test Inspection

Abstract:

The presentation explains how to perform a complete and professional Factory Acceptance Test Inspection. Due to factors such as steep competition, price pressure, globalization, higher failure rate, quality issue many end users adopted “Factory Acceptance Test Inspection” as quality assurance item in their transformer procurement procedure. Many end users created their own version of procedure or checklist to force the inspector to perform the inspection to meet the users’ quality assurance expectation.

Inspectors’ knowledge about transformer design, familiarity with the latest version of applicable standard (ANSI/IEEE, CSA, IEC), understanding of how each test is carried out and why each test is done is the key to carry out a professional Factory Acceptance Test Inspection.

Presentation 9:

Transformer receiving, assembling, installation & testing at site

Abstract:

Care is required during the receiving, assembling and installation of transformer to test the transformer at site and to put it on service. The testing at site of the transformer verifies its condition at the time it is ready for service as well as forming the baseline or signature tests for all future maintenance and later condition assessment or analysis.

The presentation will cover the processes involved with oil-filled transformers including those of:

- Receiving a transformer after transport to a substation site
- Assembly and installation of a transformer at site
- Testing of a transformer at site to verify its suitability for service

The manner and processes that are used to receive, assemble, install and test the transformer are of fundamental importance to the long life of the transformer.