

# Dissolved Gas Analysis (DGA) of Transformers and Oil-Filled Cables

## INTRODUCTION

- Dissolved Gas Analysis (DGA), initially developed for the monitoring of transformers, was recently introduced for in-service diagnostics of power cables. Criteria successfully developed for transformers are not readily applicable to cables because of significant differences in the design and operating characteristics of both systems. The diagnostic of a given cable circuit is based on the voltage rating, the individual gas concentration levels, the key gas ratios, the gas formation trends, the years in service, and the load. A new graphical representation of the IEC 599 method for the interpretation of gas ratios was developed in view of its application to power cable diagnostics. This new method, also applicable to transformers, solves most of the undetermined diagnostics given by the IEC method. The whole DGA diagnostic procedure logic is coded in an expert system shell automating the final diagnostic on the condition of the cable insulation.
- Our institute Dissolved Gas Analysis training course is intended to familiarize the participants with the components of the distribution and transformer systems, and the way in which the system delivers power to customers. Included in the course are descriptions of key system components including single and three phase lines as well as wye and delta lines. The course also addresses the state-of-the-art dissolve gas analysis for transformers available today, and it also includes the non-mineral oil filled transformers. All tests related to Dissolved Gas Analysis (DGA) of Transformers and Oil-Filled Cables will be covered in this training course.

Delegates attending Dissolved Gas Analysis training course will develop the following competencies:

- Understand the importance of oil filled power transformers
- Awareness of the characteristics of mineral oil in transformers
- Comprehend dissolved gas analysis for transformer
- Exposed to the construction of oil filled cables
- Determine dissolve gas analysis for the oil filled cables

## **PROGRAMME OBJECTIVES**

Our institute Dissolved Gas Analysis training course aims to assist delegates to achieve the following objectives:

- Define the roles and components of a power transformer
- Understand the different types of power transformer
- To appreciate the merits of transformer oil functionalities
- Identify the components of the oil filled transformer
- Understand the functionalities and purpose of dissolved gas analysis
- Competency in identifying the oil filled cables
- Perform the dissolved gas analysis for oil filled cables
- Explore the online dissolved gas analysis merits and significance

## **WHO SHOULD ATTEND?**

Our institute Dissolved Gas Analysis training course is suitable to a wide range of professionals but will greatly benefit:

- Electrical Engineers
- Maintenance Technicians
- Management Professionals
- Project Engineers

## **TRAINING METHODOLOGY**

- The goals of each participant attending our institute Dissolved Gas Analysis training course are discussed to ensure their needs are fulfilled, as far as possible. Questions are encouraged throughout, particularly at the daily wrap up sessions. This provides opportunities for participants to discuss specific issues and, if possible, find appropriate solutions. Case studies are employed to highlight particular points and appropriate video materials used to illustrate particular conditions.

## **PROGRAMME SUMMARY**

- This unique training course on Dissolved Gas Analysis will expose the various topologies to the delegates. Upon completion of the course delegates will improve the maintenance strategies of their existing oil filled equipment, hence will optimize the operations of the transformers and oil filled cables.

## PROGRAM OUTLINE

### Fundamentals Oil Filled Power Transformers and Major Components

- Construction of a power transformer
- On load tap changer characteristics
- Duval's triangle and its significance
- The bath tub curve and its relevance

### Dissolved Gas Analysis for Transformer

- Purpose and significance of dissolved gas analysis in an oil filled transformer
- Dissolve gas analysis and maintenance
- Interpreting dissolve gas analysis data
- Procedures conducting dissolve gas analysis
- DGA investigations for contents
- Online dissolved gas analysis

### Characteristics and Functionalities of Dissolved Gas Analysis for Oil Filled Cables

- Types of high voltage cables
- Construction of oil filled cables
- Partial discharge in oil filled cables
- Dissolved gas analysis applications on oil filled cables
- Interpreting dissolve gas analysis results for an oil filled cable
- Wrap up session