

COURSE OVERVIEW EE0185

Transformer Factory Test

Course Title

Transformer Factory Test

Course Date/Venue

Session 1: July 07-11, 2025/ Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Session 2: December 14-18, 2025/ Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference

EE0185

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This hands-on, highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date knowledge of power transformer major inspection and testing. It covers the transformer design and construction considerations; the testing of power transformers and measurements of voltage ratios, winding resistance, impedance voltage, load loss and current; the various types of power transformers testing and concepts frequency response analysis, dielectric frequency response and degree of polymerization.

The application, recommended limits and fault types for oil immersed transformers and the categories of equipment and standards for routine tests; the measurements of insulation resistance, its types and the measurement instruments used; the measurement instruments and analysis methods used for the measurement of voltage ratio; the capacitance and power factor, power factor measurements, hot collar technique and various types of transformer test procedures; the partial discharge techniques, causes of the occurrence and discharge; the types of partial discharge, and partial discharge system; the testing results and transformer life assessment.



Course Objectives

Upon successful completion of this course participants will be able to:-

- Analyze transformer design and construction considerations including transformer life expectancy and differentiation of various transformer oil types
- Perform proper testing of power transformers and interpret measurements of voltage rations, winding resistance, impedance voltage, load loss and current
- Demonstrate various types of power transformers testing and define concepts of frequency response analysis, dielectric frequency response and degree of polymerization
- Identify the application, recommended limits and fault types for oil immersed transformers and determine the categories of equipment and standards for routine tests
- Interpret the measurements of insulation resistance, its types and the measurement instruments used
- Identify the measurement instruments and analysis methods used for the measurement of voltage ration
- Define and describe capacitance and power factor and be able to perform power factor measurements, hot collar technique and various types of transformer test procedures
- Apply partial discharge techniques and identify the causes of the occurrence and discharge
- Enumerate the types of partial discharge and be able to calibrate and measure partial discharge system
- Analyze testing results and evaluate transformer life assessment

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (**H-STK®**). The **H-STK®** consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides a complete and up-to-date overview of power transformer major inspection & testing for engineers and technicians.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Fee

US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Certificate(s)


Internationally recognized certificates will be issued to all participants of the course completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, Haward Technology has the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Ehab Mohamed, BSc, CompEX, ETAP, is a **Senior Electromechanical Engineer** with **30 years** of extensive industrial experience within the **Oil & Gas, Refinery, Petrochemical** and **Power** industries. He specializes in **Tuning Controllers & Control Loops, Maintenance Management** Best Practices, **Rotating Equipment** Reliability Optimization, Practical **Machinery Vibration, Vibration** Techniques, Effective **Reliability Maintenance**, Excellence in **Maintenance & Reliability** Management, **Preventive & Predictive Maintenance**, Machinery Failure Analysis (**RCFA**), **Reliability** Optimization & Continuous Improvement, **Maintenance** Planning, Scheduling & Work Control, **Maintenance Management** Strategy, **Mechanical & Rotating Equipment**

Troubleshooting, Preventive Maintenance, Predictive Maintenance, Reliability Centered Maintenance (RCM), Condition Based Monitoring (CBM), FMEA, Machinery and Rotating Equipment Troubleshooting, Turbines, Bearings, Compressors and Pumps. Further he is also well-versed in **Power System Blackouts, Power System During Emergency and Blackouts, Electric Power System** Operation, Electrical Transient Analysis Program (**ETAP**), **Electrical** Installation & Maintenance, **Electrical** Inspection & Testing, **HV/LV** Equipment, **High Voltage Electrical Safety, LV & HV Electrical** System, **HV** Equipment Inspection & Maintenance, **HV Switchgear** Operation & Maintenance, **LV Distribution Switchgear & Equipment, Substation** Design & Commissioning, **Substation** Maintenance Techniques, **Switchgear** Operation & Maintenance, **Circuit Breakers & Switchgears** Inspection, **Power System** Control & Stability, Industrial **UPS** Systems & **Battery** Power Supplies, **Power Generation & Transmission, Power System Protection & Relaying, Electric Power** Calculation, **Power Systems Protection**, Distributed Control System (**DCS**) Applications & Troubleshooting, **SCADA & Industrial Communication**, Process Logic Controller (**PLC**), **Load Flow** Calculation, **Cable** Installation, **Transformer** Maintenance, Short Circuit & Protection Coordination, **Harmonic** Analysis Studies, **Earthing & Grounding, Power Factor Correction, Power System Protection & Relaying, Electric Motors & Variable Speed Drives, Power Generation, Electrical Fault** Detection & Remedies, **Electrical Control Circuits & Equipment, Hazardous Area** Classification, **Electrical Hazards, Explosion Proof Ex Equipment, Hazardous Area Classification & Intrinsic Safety, Motor** Testing & Maintenance, Modern **Power System Protective Relaying, Generators, Transformer, Office 365, Outlook 365, Visio, ETAP, AutoCAD, RAMS, HRMS, Microsoft BI** for Dashboard and Online Reports, Siemens TIA, ABB Drive, Wizard, Window, Composer Suite, SharePoint, NOV Rig Sense all versions, Cond Master Ruby for Condition Monitoring and OSIsoft Data Analytics. He is currently the **Engineering Manager** (Electrical & Controls) in **Weatherford Drilling International**.

During his career life, Mr. Ehab has gained his expertise and thorough practical experience and handling challenging positions such as being the **Engineering Manager, Product Manager, Acting Project Manager, Lead Operation Engineer, Plant Engineer, Maintenance Engineer, Electrical Project Engineer, Project Engineer, Field Support Engineer, Lead Electrical & Automation Engineer, Lead Electrical Engineer, Field Support Engineer, Application Engineer, Allen Bradley Rockwell Engineer, Lead Technical Assessor, Team Leader, Principal Teacher, Global Field Support Technician, Foreman, Technical Consultant, Technical Trainer** and **Staff Lecturer** for various companies such as the **Weatherford Drilling International Inc., Daleel Petroleum Company (DAPECO), NDSC Drilling Contractor, NOKHBA Energy, Abraj Drilling, American Standard Polymer and Acrylic Plant, Future Technologies Ltd, Industrial Technical College, Ministry of Higher Education and El-Masria Trading & Technical Services.**

Mr. Ehab has a **Bachelor's** degree in **Electrical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership of Management (ILM)**, a **Certified CompEx Inspector & Installer**, a **Certified Allen Bradley Rockwell Engineer** and a member of the **Institution of Engineering & Technology (IET)**. Moreover, he holds a certification in **Electrical Power Calculation (ETAP)** and has delivered numerous trainings, courses, workshops, seminars and conferences internationally.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction to Power Transformers <i>Historical Survey of Transformer Development and Applications</i>
0930 – 0945	Break
0945 – 1100	Introduction to Power Transformers (cont'd) <i>Transformer Design and Construction • Defining Transformer Life Expectancy</i>
1100 – 1230	Introduction to Power Transformers (cont'd) <i>The Insulation System • Life Time of Transformer</i>
1230 – 1245	Break
1245 – 1430	Introduction to Power Transformers (cont'd) <i>Transformer's Oil Types and Advantage/Disadvantages of Each Type</i>
1430	Lunch & End of Day One

Day 2

0730 – 0900	Testing of Power Transformer (Routine Tests) <i>Measurement of Voltage Ratio and Check of Vector Relationship • Measuring of Winding Resistance</i>
0900 – 0915	Break
0915 – 1100	Testing of Power Transformer (Routine Tests) (cont'd) <i>Measuring of Impedance Voltage and Load Loss • Measuring of No-Load Loss and Current • Dielectric Tests</i>
1100 – 1230	Testing of Power Transformer (Routine Tests) (cont'd...) <i>Separate- Source Voltage Withstand Test • Induced Over – Voltage Withstand Test</i>
1230 – 1245	Break
1245 – 1430	Testing of Power Transformer (Routine Tests) (cont'd...) <i>Partial Discharge Measurement • Test on On-Load Tap Changer</i>
1430	Lunch & End of Day Two

Day 3

0730 – 0900	Testing of Power Transformers (Type Tests & Special Tests) Temperature Rise Test • Measurement of Zero Sequence Impedance • Measurement of Voltage and Current Harmonics • Measurement of Insulation Resistance • Measurement of Capacitance and (tan?)
0900 – 0915	Break
0915 – 1100	Testing of Power Transformers (Type Tests & Special Tests) (cont'd) Lightning Impulse Test • Switching Impedance Test • Measurement of Acoustic Sound Level • Frequency Response Analysis (FRA) • Dielectric Frequency Response (DFR) • Degree of Polymerization (DP)
1100 – 1230	Oil Immersed Transformers Application Field • Categories of Equipments • Transformer Classification • Specification of Uninhabited Insulation Mineral Oil • Main Standards Used for Routine Tests
1230 – 1245	Break
1245 – 1430	Oil Immersed Transformers (cont'd) Recommended Limits for Unused Mineral Insulating Oil Fields in New Power Transformer • Oil Functions • Dissolved Gas Analysis (DGA) • Incipient Fault Detection in Oil Immersed Transformer and Fault Types
1430	Lunch & End of Day Three

Day 4

0730 – 0900	Measurements of Insulation Resistance Introduction of Insulation Resistance Measurements • Two Windings Measurements • Three Windings Measurements • Measurement Analysis • Measurement Instruments
0900 – 0915	Break
0915 – 1100	Measurements of Voltage Ration Introduction • Measuring Circuit • Measurements Analysis • Measurement Instruments
1100 – 1230	Capacitance & Power Factor (C & tan?) Introduction • Measurement Instruments • Bushing Capacitance • Power Factor Measurements • Tap Insulation Capacitance • Hot Collar Technique • Transformer Capacitance
1230 – 1245	Break
1245 – 1430	Capacitance & Power Factor (C & tan?) (cont'd) Two Windings Transformer Test Procedures • Three Windings Transformer Test Procedures • General Test Procedures for Windings • Losses and Cos # Variation with Test Voltage • Test of Oil Insulation Power Factor • Transformer Exciting Current Measurements
1430	Lunch & End of Day Four

Day 5

0730 – 0900	Partial Discharge Techniques <i>Introduction • What is Partial Discharge? • Why Test for Partial Discharge? • Occurrence of Discharge • Physical Background of Partial Discharge</i>
0900 – 0915	<i>Break</i>
0915 – 1100	Partial Discharge Techniques (cont'd) <i>Type of Partial Discharge • Magnitude of Discharge • Characteristics of Patterns • Partial Discharge Test Facility • Partial Discharge with Induced</i>
1100 – 1230	Partial Discharge Techniques (cont'd) <i>Actual Detection Circuits • How to Calibrate the Partial Discharge System • How to Measure Partial Discharge • Partial Discharge Methods Available • On-Site Partial Discharge Measurements</i>
1230 – 1245	<i>Break</i>
1245 – 1400	Transformer Life Assessment (Analysis of All Testing Results)
1400 – 1415	POST-TEST
1415 – 1430	<i>Presentation of Certificates</i>
1430	<i>Lunch & End of Course</i>

Practical Sessions

This hands-on, highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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