

HANDS-ON COMPETENCY BASED TRAINING IN INSULATION POWER FACTOR (IPF) FOR POWER TRANSFORMER

TESDA Accredited

At the end of the session, the participants will be able to:

- Interpret transformer testing protocols
- Evaluate results of the measured values
- Identify course principles and methodologies of transformer engineering

At the end of the session, the participants will receive:

- Certificate of Completion, TESDA Accredited
- Continuing Professional Education points (as required by PRC and IIEE)
- Recommendation of Competency (upon completion of Supervisor evaluation)

PAMAV PAMAV TRAINING INSTITUTE & TECHNOLOGY CENTER



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HANDS-ON COMPETENCY BASED TRAINING IN INSULATION POWER FACTOR (IPF) FOR POWER TRANSFORMER

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- Transformer Theoretical Basics
- Phasor, Classification, Construction, Cooling
- Tap Changes, Rating and Specifications, Standards
- Insulating Oil, Transformer Loading, Protection
- Electrical Tests & Maintenance & Internationally Accepted Tests
- Transformer Applications and Manufacturing
- Hands On Testing
- Assessments By Examinations

July 10, 17, 24, 2010

August 19, 20, 21, 2010

September 11, 18, 25, 2010

October 9, 16, 23, 2010

November 13, 20, 27, 2010

Cebu

August 12, 13, 14, 2010

September 28, 29, 30, 2010

December 2, 3, 4, 2010

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COURSE BACKGROUND:

The EPIRA law mandates reliability, efficiency and practically zero downtime in substation apparatus operation. Technical services group, power system maintenance team and facilities maintenance engineers are the front liners in ensuring the asset longevity operation and recovery of investments.

The unpredictability of operation lies in the way substation assets are maintained and this technical training will guide experienced power transformer maintenance engineer improve his knowledge based on international standards.

COURSE HIGHLIGHTS:

- Identifies performance requirements
- Presents transformer basics applications, manufacturing and hands on testing on off line power transformer at site
- Emphasize methods in insulation power factor testing
- Proposes plans on periodic, predictive and condition based maintenance

WHO SHOULD ATTEND?

- Electrical engineers in the Utilities
- Electrical engineers and electricians in commercial and industrial maintenance
- Electrical consultants and designers and electrical project managers
- Electrical engineering graduates who would like to be test engineers and technicians

COURSE FEE:

PhP 12,800.00 inclusive of snacks, lunch, Certificate of Completion – TESDA Accredited
A processing fee of PhP 500.00 will be charged CPE points accreditation

SUBSTATION APPARATUS MAINTENANCE IN PREDICTABLE WAYS:

This practical course provides you with methods and procedures used internationally. Predictive, periodic or condition based (on line diagnostics & monitoring) maintenance are the basis which methodology is applicable. The course includes a novice, or an experienced maintenance technical staff should know to be effective as a test engineer, and for an advanced test engineer to learn new concepts in power transformer testing, filtering, and interpretation.

The course will also focus on issues related to causes of bushing breakdown, arresters, oil impedance, leakage reactance and most of all short circuit rating a transformer can withstand.

Please note the course content does not include DGA (dissolved gas analysis) completely.

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COURSE OUTLINE

DAY 1

Transformer Theoretical Basics

- Transformer Principles**
 - Transformers
 - Right hand rule, magnetic flux, magnetic induction
 - Left hand rule, turns ratio
 - Transformer losses and types

- Phasor Diagrams**
 - Operating principles
 - Operation without load
 - Operation with load

- Transformer Classifications, Constructions, Cooling**
 - Service class, instrument transformers: current & potential transformers
 - Magnetizing circuits, losses; copper, hysteresis, eddy-current
 - Efficiency

- Tap Changers, Standards**
 - ANSI and IEC standards

- Insulating Oil**
 - Function and oil deterioration
 - Decay products and sludge
 - Sampling technique; general safety technique, oil sampling bottles, syringe, cautions and common mistakes
 - Nitrogen: total combustible gases, oxygen
 - Routine test: color, dielectric breakdown voltage, interfacial tension, neutralization number, moisture, visual
 - Gas analysis: oxygen

DAY 2

- Transformer Load**
 - Aging of insulation
 - Analysis of overload curves
 - Functional life testing

- Transformer loading guides**
 - Transformer Protection
 - Overload and overcurrent phenomenon
 - BIL, withstand capability
 - Short circuit withstand capability
 - Overvoltage protection
 - Overcurrent protection

3. Electrical Test

- DC Testing
- Insulating resistance
- Core ground test
- Interpreting the results
- AC testing
- Power factor: winding, bushing, oil
- Turns ration (TTR)
- Overall winding insulation
- Core excitation
- Leakage reactance
- Interpretation of results

4. Transformer Maintenance and Applications of Testing

- Frequency of maintenance tests and repair
- Recommended maintenance schedules
- In field repair
- Oil filtering
- Drying out: moisture problems and heat drying methods, heat and vacuum methods, determining dry insulation
- Service repair

5. Transformer Preventive Maintenance

- Load and voltage
- Temperature
- Liquid level
- Pressure – vacuum gage
- Dehydrating breathers
- Bushing and tap changers
- Control equipment
- Lightning arrester Transformer tanks and joints

DAY 3

Hands-on venue to be announced

- Transformer Standards, Specifications, Design and construction
- Transformer manufacturing processes
- Transformer Evaluation
- Transformer Testing

- Basic Application of Apparatus Testing
- Understanding Software inputs
- Power Factor / Dissipation Factor
- Single Phase Excitation Transformer Turns Ration (TTR)
- Leakage Reactance/
- Short Circuit Impedance Test
- Oil Power Factor
- Bushing C1, C2, Hot Collar

YOUR INSTRUCTORS:

Engr. Rodolfo R. Peñalosa, PEE, PECE, Apec Engr.

Engr. Penalosa is the Chairman and President of . He is also the President of WESTCO is a sister company of PAMAV specializing in providing electrical testing services and equipment. Engr. Penalosa is a visionary and leader of testing equipment and tools for the development and advancement of the Electrical Engineering Profession. He is a keynote speaker on Electrical Engineering Law, Substation testing and key areas in the Electrical Engineering field and has addressed various audiences both locally and the international scene. He led the Continuing Professional Education Council of the Professional Regulation Commission (PRC) as a Chairman for nine years. Currently, Engr. Penalosa is the Chairman of the Technical Panel for Engineering, Technology (TPET) of the Commission on Higher Education (CHED) and a member of the Construction Arbitration by The CIAC. His expertise contributed to being a Philippine Representative of CHED in Japan, Brunei and Pennsylvania covering the aspects of Electrical Professional Practice and Standards and APEC Competency Standards Development for Engineer Registry. Engr. Penalosa also holds Past President of Society of Philippine Electrical Contractors & Suppliers (SPECS, 1992), the Institute of Integrated Electrical Engineers of the Phils (IIEE, 1995), Past Chairman of Construction Manpower-Development Foundation, National Construction Productivity Development Plan, Department of Trade and Industry (DTI/JICA, 1994 to 1996), the President of Society of Philippine Accredited Consultants (SPAC, 2007-08) and a Past President of the Philippine Association of Board Examiners (PABE, 2001 & 2002). Engr. Penalosa has attended extensive trainings in Power System Maintenance by DOBLE in Finland, Boston and Singapore and holds a degree in Bachelor of Science in Electrical Engineering from FEATI Universtiy.

Engr. Ulysses B. Paguio, PEE

Engr. Paguio is a Training Consultant of PAMAVTech. Engr. Paguio's expertise comes from years of experience as a Power Systems and Testing Engineer in the Middle East and the Philippines servicing companies such as: Siemens, ABB Industry, Inc., and Manila Electric Company to name a few. He is also a Professor of the Electrical Engineering department at the Mapua Institute of Technology in the Philippines teaching. Engr. Paguio's expertise is on the aspects of Power System Engineering and Testing. He graduated Bachelor of Science in Electrical Engineering and is currently continuing his Master of Science in Technological University of the Philippines.

Engr. Eduardo M. Pabuna, REE

Engr. Pabuna specializes in substation testing and has handled transformer maintenance for various clients such as: Clark, National Transmission Corp, San Miguel, Mactan Airport, Wyeth Philippines and Steel Asia to name a few. His expertise comes from preparing, execution and analysis of the insulation power factor test procedure. Engr. Pabuna has attended various seminars on the aspects of Power Circuit Breaker Testing, EDSA Power Sytem Design Analysis and Simulation in San Diego, California and has been a key note speaker on the subjects of Testing and Commissioning of Intelligent Diagnostic Device at ABB in Thailand and conference on Electrical Design and Maintenance organized by the Integrated Institute of Electrical Engineers (IIEE).

REGISTRATION

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Please check the date:

- Date:**
- July 10, 17, 24, 2010
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Cebu

- August 12 to 14, 2010
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- December 2 to 4, 2010

Venue: PAMAVTECH, 7F Integrated Professional Office Building 14 Quezon Avenue Quezon City

Time: 8:00 a.m. to 5:00 p.m. on each day

Please fill up and return to fax 740-7602 or admin@pamavtech.com. Provide one form for each participant.

| | |
|--|---------------------|
| NAME (as you want to appear on certificate. Title, first name, middle initial, last name, suffix) | |
| DESIGNATION | |
| COMPANY NAME | |
| TELEPHONE | LOCAL NUMBER |
| CELLPHONE | |
| EMAIL ADDRESS | |

Payment:

Reservations without payment do not confirm your slot. To confirm your reservation, please pay the course fee of Php 12,800.00 per person thru China Bank (Quezon Avenue branch) Account name PAMAV Training Institute & Technology Center, C/A#: 107-119555-8. Please attach the deposit slip with this form.