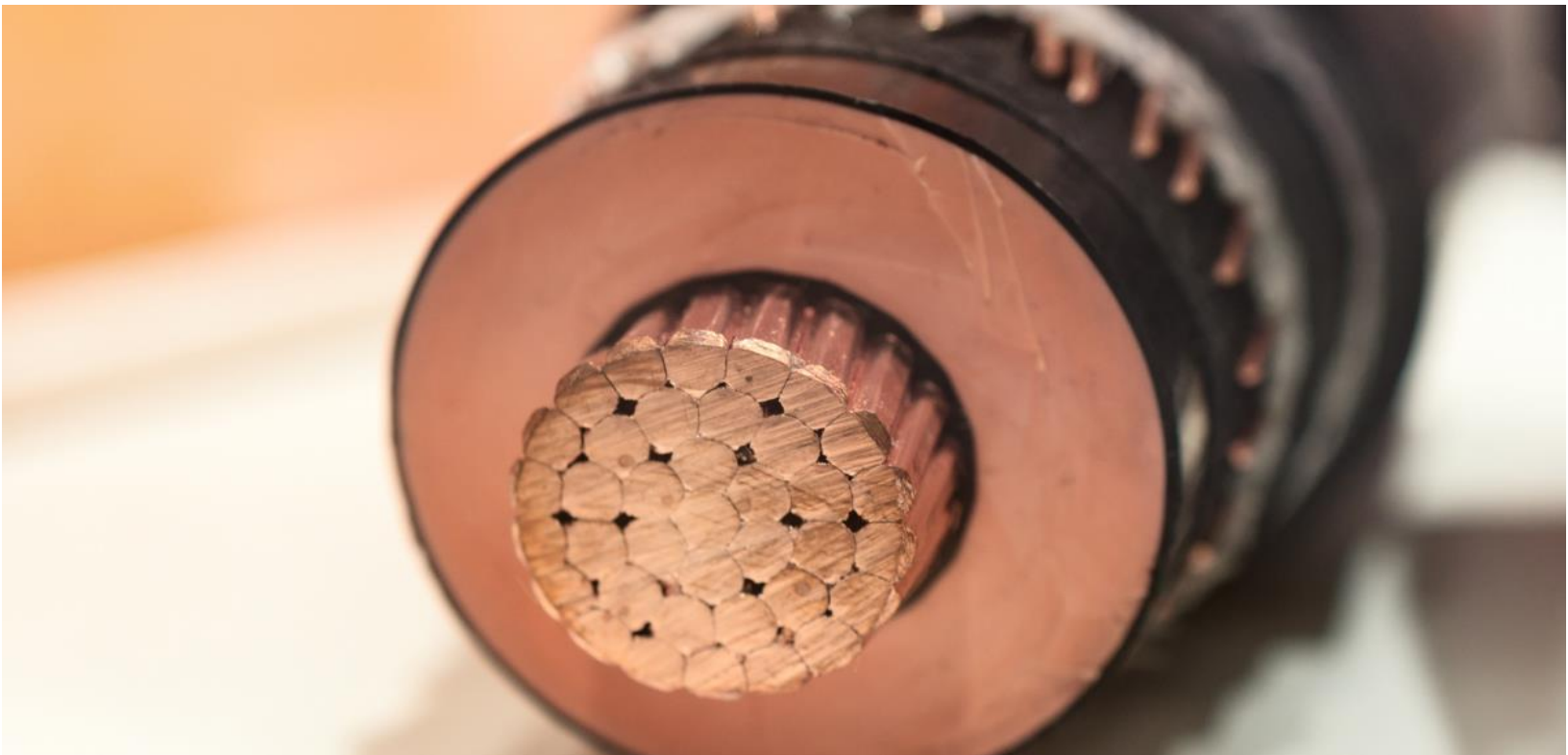


# Cable Systems: Commissioning & Maintenance Test

Provide the knowledge required to manage the power cables from commission to condition assessment during their lives.

10<sup>th</sup> – 12<sup>th</sup> Jan 2023 | 09:00 – 17:00 (GMT+8) Daily | Kuala Lumpur, Malaysia



# Cable Systems : Commissioning and Maintenance Test (3 Days)

10<sup>th</sup> – 12<sup>th</sup> Jan 2023 | Kuala Lumpur, Malaysia

Medium voltage, High voltage and Extra High voltage cable systems represent an important part of our electrical network and their assessment is important to keep the load flow. Low quality installation and testing of cables are also one of the main reasons for early life failures. Appropriate management of the cables from commissioning to condition assessment during the lives improves cable's lifetime.

The Masterclass will start with reviewing of the existing electrical stresses within the power cables and describing the main defects that can be present. The participant will have complete understanding of the International standard requirements for power cable commissioning as well as the diagnostic test required to complete the commissioning. This will also include the safety precautions to be used for each test especially on the high voltage testing. The instructor will further explain the measurement of offline partial discharge on Extra High Voltage cable and will also include special test which is an add-on on the commissioning procedures.

Relevant maintenance tests available for assessing the presence of the cable's defects are then described during the second and third session in order to provide the right tools to properly design the testing strategy based on the characteristics of the cable systems installed.

## Attendees will further improve their practical knowledge on:

- **Cable Classification :** Provides the basic to recognize the differences between the existing cable systems.
- **Typical defects :** Provides an overview of the possible issues which can occur within the cable systems. Partial discharge and Water trees processes are described in depth since are the two most common issues in the modern cables.
- **Commissioning Test:** Review the international standard and provide practical test procedures
- **Diagnostic Test:** Provides an explanation of the diagnostic test, general procedure, test result evaluation. This will help engineers to select the right test based on with benchmark has to be monitored. (Diagnostic tests to international standards)
- **Assessment strategies:** Provides a guideline for design the assessment strategy (including commissioning and condition assessment) within their plant/network.

The 3 days training will provide the knowledge of cable design, electrical stresses and defects as well as the diagnostic test require to verify the condition. The application of the diagnostic test is described to explain how to commission new cable system as per international standard and condition assessment of existing cable. This will be augmented by case studies to show some real examples of assessment.

## Advance your knowledge and learn about:

- Cable classification and characteristic
- Main cable defects
- Failure modes processes
- Selection of the right diagnostic test
- Diagnostic tests limitations and tests advantages
- Test result evaluation
- Condition assessment practice
- Commissioning test industry practice
- Assessment of the diagnostic data
- Condition assessment tests

## **This program is intended for:**

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This comprehensive Masterclass will be valuable to professionals who work in the power industry, oil & gas plants, refineries, chemical & petrochemical plants, mining, manufacturing, fertilizer & process industries that uses **Medium voltage, High voltage and Extra High voltage cable systems**. It also applies to **underground cables**.

- Electrical engineer
- Service engineer & Testing Engineering
- Engineering, Testing and Maintenance
- Managers / Maintenance personnel / Technicians
- Engineers who wish to learn how to assess the cable conditions.
- Engineers who want to know how to assess their existing cables and also the test performed in the commissioning.
- Anyone involves in HVAC cables, Extra High voltage, Medium voltage cable systems.

# Cable Assessment : Commissioning & Maintenance Test (3 Days)

## Kuala Lumpur, Malaysia | Course Outline

### DAY 1

#### Cable design and characteristics

- Theory
- Design characteristics
- Components
- Electrical field distribution
- Voltage line distribution
- Terminations/joint voltage grading systems

#### Cable systems classification:

- Medium voltage
- High voltage
- Extra high voltage
- Example of different design

#### Cable defects:

- Defect classification
- Defect's development process
- Main diagnostic marker for each defect
- Partial discharge process detailed description
- Tan Delta process detailed description

#### Cable Commissioning test (Mv):

- Medium Voltage cable:
  - International standard overview
  - International Standard commissioning test procedure:
    - Oversheath test
    - Voltage Withstand
  - Condition Assessment test:
    - Tan Delta
    - Partial Discharge
    - Diagnostic data collection and results interpretation
  - Asset Owner commissioning test procedure

### DAY 2

#### Cable Commissioning test (HV/EHV):

- High Voltage / Extra High Voltage
  - International standard overview
  - International Standard commissioning test procedure:
    - Oversheath test
    - Voltage Withstand
  - Condition Assessment test:
    - Partial discharge
    - Diagnostic data collection and results interpretation
  - Special test:
    - Bonding verification
    - Sequence Impedance test
  - Asset Owner commissioning test procedure

### DAY 2

#### Cable Maintenance test Part 1:

- Classification
- External insulation diagnostic test
- Internal insulation diagnostic test
- Description of each diagnostic test (part 1):
  - Type of defect detectable
  - Test theoretical explanation
  - Test procedure
  - Test results evaluation – guideline

### DAY 3

#### Cable Maintenance test Part 2:

- Description of each diagnostic test (part 2):
  - Type of defect detectable
  - Test theoretical explanation
  - Test procedure
  - Test results evaluation – guideline

#### Assessment strategies

- Required information
- Example of strategy using:
  - Cable life's stage
  - Rated voltage
  - Insulation material
- Strategy including:
  - Commissioning test
  - Online/Offline tests

#### Demonstration & Case Studies:

Having the ability to implement directly once you are back at your workplace is crucial for every participant. During the 3 days Masterclass case studies, interactive discussion with participants and relevant industry experiences will be share.

- Example of online Commissioning on Extra high voltage Cable (Power Transmission)
- Example of online assessment strategy implementation on a Cement factory
- Example of offline assessment strategy implementation on an Oil & Gas facility
- Many more examples from different industry will be share.

\*\*Demostrative cable set will be used by the presenter to describe the topics.

Participant are encouraged to bring 1 – 2 cases of their own to discuss (Time permitting)

# Cable Assessment : Commissioning & Maintenance Test (3 Days)

10<sup>th</sup> – 12<sup>th</sup> Jan 2023 | Kuala Lumpur, Malaysia

## Registration Form



Cable Assessment : Commissioning & Maintenance Test	3 or more Participant	Per Participant	<b>PROGRAM DETAILS</b> Kuala Lumpur, Malaysia Date: 10 <sup>th</sup> – 12 <sup>th</sup> Jan 2023 Time: 09:00 – 17:00 (GMT+8)
Full 3 Days	SGD 2799 ( )	SGD 2999 ( )	<b>STEPS TO REGISTER:</b> Simply fill up the registration form and email it to: Email to : <a href="mailto:registration@petro1.com.my">registration@petro1.com.my</a> Call us : +603 7727 3952 Mobile /Whatsapp: +6012 568 4696 (Harn)
<ul style="list-style-type: none"><li>• The above investment fee is inclusive of course material, tea breaks and lunch.</li><li>• This course is limited to 15 attendees to ensure that the course can remain interactive.</li><li>• The above investment fee is excluding of SST 6%.</li></ul>			
<b>Want to Train your whole team</b> at your Convenient Time and Location through in-house training ? Contact +6012 568 4696 (Harn) or email us at <a href="mailto:intraining@petro1.com.my">intraining@petro1.com.my</a> or visit us at <a href="http://www.energy1asia.com">www.energy1asia.com</a>			

### Delegates Details

1. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

2. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

3. Name: \_\_\_\_\_ Mr  Mrs  Ms  Dr

Job Title: \_\_\_\_\_

Email : \_\_\_\_\_

Contact No: \_\_\_\_\_

Department: \_\_\_\_\_

**Head of Department:** \_\_\_\_\_

### Invoice Details

Invoice Attention to: \_\_\_\_\_

Company: \_\_\_\_\_

Industry: \_\_\_\_\_

Address: \_\_\_\_\_

Postcode: \_\_\_\_\_ Country: \_\_\_\_\_

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

Email: \_\_\_\_\_

Authorized Signature : \_\_\_\_\_

### Payment Method

By Direct Transfer: Please quote invoice numbers on remittance advice.

ACCOUNT NAME : PETRO1 SDN BHD

BANK : United Overseas Bank (Malaysia) BHD

ACCOUNT NO : 202 900 3191 (SGD)

All bank charges to be borne by payers. Please ensure that PETRO1 SDN BHD received the full invoice amount.

### CREDIT CARD PAYMENT

Credit card payment will include a charge 3.1%.

**Payment Policy:** Upon receipt of a completed registration form, it confirms that the organization is registering for the seat(s) of the participant(s) to attend the conference or training workshop. Payment is required with registration and must be received prior to the event to guarantee the seat. Payment has to be received 7 working days prior to the event date to confirm registration.

### DATA PROTECTION

The information you provide will be safeguarded by Petro1 that may be used to keep you informed of relevant products and services. We take it seriously when it comes to protection of our client data.

### Sales and service Tax (SST):

The above investment fee is excluding of SST 6%. The SST charges of 6% will be include during issuance of the invoices.

### Cancellation & Substitutions:

Should you be unable to attend, substitutes are always welcome anytime at no additional cost. Please inform us as early as possible. Payment is non-refundable if cancellation occurs 7 working days prior to event commencement. However, delegates will receive a 100% credit on the amount paid which can be used in another PETRO1 SDN BHD training course for up to one year from the date of issuance. The credit is transferable to other persons in the same company and applicable against any future PETRO1 SDN BHD public course/ Online Live Webinar. If cancellation occurs 7 working days prior to the registration date and there is no substitute, the organizer reserves the right to charge 50% of the total investment from your organization.

In the event that, PETRO1 SDN BHD. postpones or cancels a course, delegate payments at the date of cancellation or postponement will be credited to a future PETRO1 SDN BHD course. This credit will be available for up to one year from the date of issuance, and it is transferable to other persons in the same company and applicable against any future PETRO1 SDN BHD public course.

PETRO1 SDN BHD is not responsible for any loss or damage as a result of a substitution, alteration or cancellation/postponement of an event. PETRO1 SDN BHD shall assume no liability whatsoever in the event this training course is cancelled, rescheduled or postponed due to a fortuitous event, Act of God, war, fire, labor strike, extreme weather or other emergency.

### Program Change policy:

The organizer reserves the right to make any amendments and/or changes to the webinar, Date/ time, facilitator replacements and/or modules if warranted by circumstances beyond its control.

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