

Fakulti: FAKULTI KEJURUTERAAN ELEKTRIK	
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SEE 4722

**FAKULTI KEJURUTERAAN ELEKTRIK
UNIVERSITI TEKNOLOGI MALAYSIA
KAMPUS SKUDAI
JOHOR**

MAKMAL

**INSTITUT VOLTAN DAN ARUS TINGGI
PROBLEM (Experiment 05)**

**Performance of underground XLPE cable according to the
dielectric strength-1**

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Introduction

Power cable technology had its beginning in the 1880's when the need for power distribution cable became important. Some of the earliest power cables used glass, porcelain, solid and liquid insulating materials. Also some of the power cables used natural rubber, gutta-percha, oil and wax, resin and asphalt, jute, hemp and cotton.

First oil-impregnated-paper power cable was introduced in 1890. In the late 1960s power distribution cables insulated with cross-linked polyethylene (XLPE). Then XLPE has been used over the world as electrical insulating material in underground distribution and transmission class cable because of their excellent dielectric strength, low dielectric permittivity and loss factor, good dimensional stability, solvent resistance and good thermo-mechanical behavior.

Problem Statement:

Although, underground XLPE cables provided excellent electrical and mechanical performance there are some weaknesses faced by XLPE cables which bring down their performance in service. Some mechanisms can affect the performance of the cable system as internal discharge, improper cable joints, terminations and moisture absorption will affect the cable performance. In order to evaluate the performance of underground XLPE cable, there are several factors or parameters that should be considered.

Students are required to investigate the performance of XLPE cables based on the dielectric strength, dissipation factor ($\tan \delta$) or power factor, capacitance, partial discharge and insulation resistance.

Trigger

The performance of the cable can be obtained by measuring several dielectric properties and physical parameters values such as;

- ❖ Dielectric strength
 - Power Frequency tests
 - Partial Discharge

- 1) What is the definition of such dielectric strength and how do you relate with the performance of the cable?
- 2) How do you measure the dielectric strength and related to the cable usage?
- 3) What the effects of the above parameters to estimate the long life of the cable?
- 4) What should you do so that the some performance can be maintained in good condition for the long run of the cable live?