High Voltage Insulation System (ELEC 6089)

Assignment One --- HV AC 275kV Bushing Design

Objectives: The design and construction of high voltage apparatus requires experience in the application of the laws of electric fields. The objectives of this excise is to design a 275 kV HV bushing using capacitive grading technique. The electric fields obtained in your designs require to be compared with modelling results.

HV bushing overall dimensions
The dimensions given below are based on a failed real 275kV HV bushing.
Inner diameter = 100 mm
Outer diameter = 300 mm
First foil length = 5000 mm
N=21
Foil thickness = 0.1 mm
One end exposed to air and the other to oil
Schematic drawing of the above HV bushing is shown in Figure 1.

Insulation Design
Under ac conditions, double-sided capacitive gradings are typically required for HV bushings.

(a) Use either radial or axial grading to design the above bushing.
(b) Determine the electric fields at the interface

Field Modelling
You are required to do field modelling based on your chosen design. Both Opera2D and COMSOL Multiphysics software packages will be available for field modelling. When you model the field distribution in the HV bushing, more emphasis should be placed on the interfaces.

Report writing:
You may consider the following items in your report:
Abstract
A brief review on field design in HV equipment
Grading methods for dc and ac applications
HV bushing and two capacitive grading methods
Actual design details for 275kV AC bushing
Electric field modelling
Comparison and discussion (Suggestions on improvement)
Conclusions

Assessment (see details below)
Your report will be assessed in following areas
(i) Layout and presentation
(ii) Content
(iii) References and citations
(iv) Individual contribution

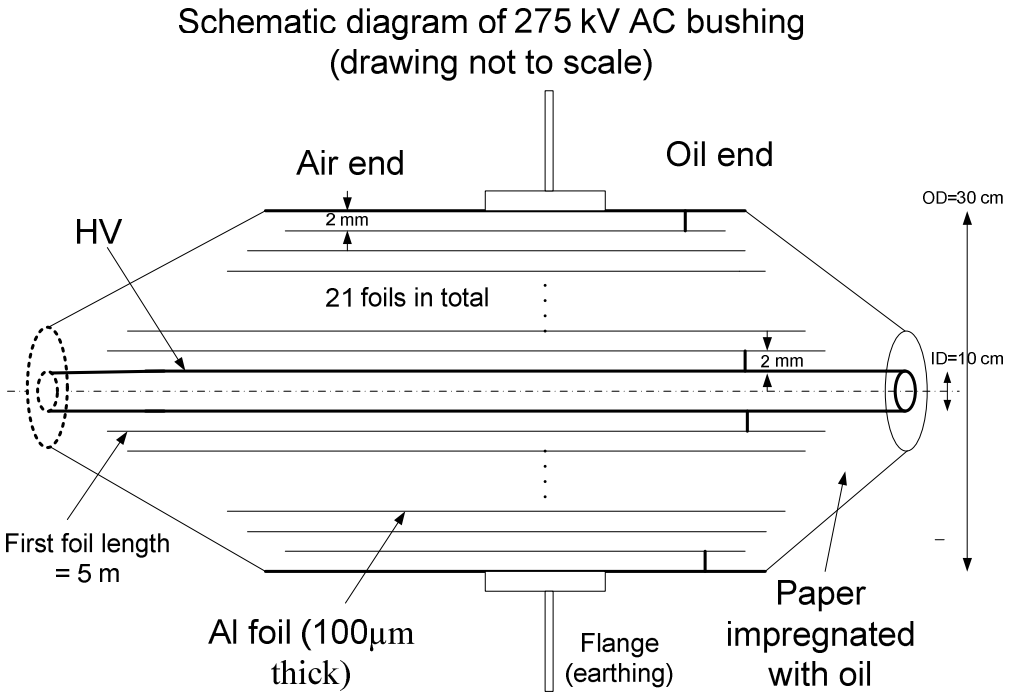

Figure 1

ELEC6089 High Voltage Insulation Systems-- Assignment One Mark Sheet

Group: Name: Overall Marks: /50

Marking components & scheme	Marks	Comments
Layout & presentation /6		
Abstract /4		
Content /9		
Accuracy /7		
Discussion /8		
Conclusion /5		
References and citations /6		
Individual contribution /5		