



GIS/GIL/SF₆-Tutorial

Announcement

**POWER ENGINEERING SOCIETY
SUBSTATIONS COMMITTEE**

**Sunday, April 15th, 2007 from 8:00 a.m. – 12:00 noon,
Bellevue, WA**

The Tutorial has 3 main parts:

I. Gas Insulated Substation GIS

- Development and Manufacturing, Monitoring, Operations and Maintenance
- How to Specify a GIS
- Execution of a GIS Project - Planning and Engineering Process
- GIS Reliability IEEE GIS Tutorial
- Applications
- Site Installation, Testing and Commissioning

II. Gas Insulated Transmission Lines GIL

- Design
- Site Assembly and Installation
- On Site Testing of GIL, Maintenance
- Comparison OHL/Cable/GIL

III. Sulphur Hexafluoride SF₆

- Overview, SF₆-Closed Cycle
- Life Cycle Assessment
- User Agreements
- Bibliography, References

In chapter 1 "GIS - Gas-Insulated Substations" an overview is given about design of GIS, technologies, and world-wide experiences. The steps of technical development, changes of technical design, state of the art in the production, and quality insurance are explained with practical examples. Focus is given to applications world-wide with typical projects shown, including on-site works, sequences of erection, testing, and civil works. Explanations are given about the operational primary equipment (switching, grounding, disconnecting), secondary system, gas handling, maintenance, and monitoring. References are made to failure statistic published in CIGRE statistic, to standards, and important publications in CIGRE and IEEE. Information about guidelines for specification and checklists of GIS/AIS comparison are given.

In chapter 2 "GIL - Gas-Insulated Transmission Lines" an overview about design, technologies, basics, gas mixture, and experience are given. The steps of development, technical changes, state of the art manufacturing, on-site works, and testing of long lengths are some topics in focus. Also design, world-wide experiences, and applications for the typical laying methods and on-site works including prefabrication, assembly, laying methods, testing, and gas handling with filling, reuse, storage of the gas or gas mixture are explained. Operation advantages including low losses for transmission, no phase angle compensation, very low electromagnetic fields and high reliability are discussed in the tutorial. Reference to standards in IEC, brochure from CIGRE and important publications are made.

In chapter 3 "SF₆-Environmental Aspects" an overview about the basics of SF₆, its high voltage application, its insulating and switching advantages, and the often discussed global warming potential (GWP) is given. The SF₆-closed cycle including filling, cleaning, reuse, and, if needed, final burning is explained. A life cycle assessment based on a German study, which indicates savings of GWP with SF₆ will be discussed. Information about the user agreement of non-release of SF₆ to atmosphere, and the world-wide protocol system of buyings are given. The participants are receiving a certificate for the tutorial participation and a CD-ROM with all the information given in the tutorial including the presentations, text and videos.