GCC Electrical
Testing Laboratory
المفتبر الفليجي لفحص المعدات الكهربانية

HVDC Transmission Systems Technology and Application

HVCD systems are becoming more and more important in any interconnection between different electrical systems. Moreover, his innovative technology allows more transmission capacity. The different technology choices must be carefully evaluated since the conceptual studies. A clear understanding of the differences between usual AC application and DC, the maturity stage of the component and the future perspective must be known by any manager in charge of the network development.

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Education
Course Code: **E04**

HVDC Transmission Systems Technology and Application

FEBRUARY
4 - 8
2018

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Objectives

The course provides an outline of HVDC systems technology, with the reason for its application. It deals with the main technical issues associated to this technology and it is addressed mainly to the conceptual design of such systems.

Addressed to:

Electrical Engineers involved in the basic design of interconnection based on HVDC System

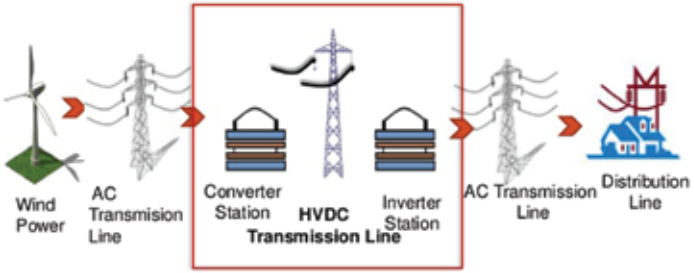
Duration:

5 Full Days

Location/Venue:

GCCIA HQ, Dammam

Course Fees:



PROGRAM HVDC Transmission Systems Technology and Application

The Course program contains the following training outline:

DAY 1

Introduction to the HDVC Systems; includes the following:

a. Reasons for the use of the Direct Current transmission (Advantages and disadvantages of DC & Break-even distance)
b. Type of HVDC technology (LCC, VSC)
c. Description of the link configurations (bipolar, monopolar,)
d. Description of the typical arrangement of a converter station (LCC and VSC)
e. General presentation of the HVDC links in the world
f. Simple comparison of converter station, transmission line and cable costs

DAY 2

Conversion Principles

a. AC/DC conversion principles for LCC converters (single and multi-phase converter bridge arrangements)
b. Three Phase Graetz Bridge
c. Different HVDC arrangements (bipolar, multiterminal, back to back, etc.)
d. Overlap angle, extinction angle (Development of basic dc network equations)
e. AC/DC conversion principles for VSC converters
f. Description of the main characteristics of the semiconductor power devices used in HVDC systems

DAY 3

Interaction with The AC Network: Reactive Power Requirements

a. Passive and active means for supply of reactive power
b. Co-ordination of reactive power sources
c. Active filters
d. AC harmonics requirements and AC filters basic characteristics
e. DC harmonics requirements and DC filters basic characteristics
f. Interaction with nearby generators
g. Short circuit ratio: converter interactions with strong and weak ac systems

DAY 4

Requirements for An HVDC Link

a. Lay-out and main components
b. Environmental Feasibility study: The Desk Top Study
c. Seismic requirements
d. Reliability and availability performances
e. Losses performance
f. Environmental performances (radio interference, electric and magnetic fields, audible noise)

DAY 5

Control and Protection Systems

a. Basic introduction to thyristor and IGBT technology
b. Control overview
c. Co-ordination of inverter and rectifier Characteristics
d. Current control, extinction angle control, voltage
e. control, current error control
f. Voltage dependent current order limits
g. Firing control, phase-locking and bypass pair
h. Operation
i. Higher order controls
j. Controller changes (step changes in controller reference settings)
k. Electro-magnetic Digital Simulation (PSCAD-EMTDC)
l. Redundancy in control system